Elektra Installation, Commissioning and Maintenance Manual

Document No. 667/HB/33930/000

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SAFETY WARNINGS

In the interests of health and safety, when using or servicing this equipment, the following instructions must be noted and adhered to:

(i) Only Skilled or Instructed personnel with relevant technical knowledge and experience, who are also familiar with the safety procedures required when dealing with modern electrical or electronic equipment, are to be allowed to use and/or work on the equipment. All work shall be performed in accordance with the Electricity at work Regulations 1989 and the relevant Highways Agency (DoT) procedures of test and maintenance.

(ii) Such personnel must take heed of all relevant notes, cautions and warnings in this handbook, and any other documents and handbook associated with the equipment including, but not restricted to, the following:

(a) The equipment must be correctly connected to the specified incoming power supply.
(b) The equipment must be disconnected/isolated from the incoming power supply before removing protective covers or working on any part from which protective covers have been removed.

Batteries
This equipment contains a Lithium battery and a Lead Acid Battery. Do not short circuit, recharge, puncture, take apart, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product, otherwise there is a risk of fire or explosion. Batteries should be handled and stored carefully to avoid short circuits. Do not store in disorderly fashion, or allow metal objects to be mixed with stored batteries. Keep batteries between -30°C and 35°C for prolonged storage. The batteries are sealed units which are not hazardous when used according to these recommendations. Do not breathe vapours or touch any internal material with bare hands. Battery disposal method should be in accordance with local, state and government regulations. In many countries, batteries should not be disposed of into ordinary household waste. They must be recycled properly to protect the environment and to cut down on the waste of precious resources.

IMPORTANT

There are several RJ45 connectors used within the sign. With the exception of the connector at the rear of the Gemini, they are not Ethernet ports and should not be connected to other equipment, including PCs.

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Change History

Version	Date	Change	Author
a	14 January 2010	First draft	S. White
b	29 June 2010	Update	L.Crawley
c	16 August 2010	Update	L.Crawley
d	28 August 2010	Update	L.Crawley/A. White/K. Napper
e	23 December 2010	Update	A. White
f	20 January 2011	Update	A. White
1	20 January 2011	First Issue	A. White
2	01 February 2016	TS008196 correct light sensor partnumbers in spares list	H. Smyth

Table 1 - Change History

1 INTRODUCTION

1.1 PURPOSE

This document is intended to provide sufficient information to the user to Install, Commission and Maintain Elektra Car Park Guidance and Message Signs.

1.2 SCOPE

This document covers the Installation, Commissioning and Maintenance of the Elektra Signs, and should be used in conjunction with the GVP Reference Manual (667/HB/31760/000). If an Outstation Support Server is being used, the Outstation Support Server Handbook (667/HB/31760/100) should be consulted.

The GVP Reference Manual is intended as a reference manual for the Gemini 2 Generic Versatile Platform (GVP) web interface and handset commands. The manual describes the web screens and handset commands provided by the basic GVP, with each application running on GVP having additional web screens and handset commands, which are described in individual product handbooks.

The Outstation Support Server (OSS) Handbook covers the installation and use of the OSS including details of software package management and configuration backup facilities for Siemens networked outstations. The OSS software covered in the handbook is identified as part number 667/TZ/32450/000.

1.3 ABREVIATIONS

Document Specific Abbreviations and Definitions

Abbreviation	Explanation
ASCII	American Standard Code for Information Interchange – a character encoding, based on the English alphabet.
CPC	Circuit Protective conductor
CPU	Central Processing Unit (computer)
DNO	Distributed Network Operator
DSL	DSL (Digital Subscriber Line) is a set of standards (e.g. ADSL, VDSL) for broadband network connectivity over public telephone lines.
ELV	Extra Low Voltage – a voltage defined by IEC 61201 and PD 6536 as being one which does not have a potential above ground of greater than 50V rms AC or 120V DC
ELI	Earth Loop Impedance
EMC	Electromagnetic Compatibility
FLASH	Non-volatile read/write memory, programmable in blocks. Fast and cheap mass storage for applications that require non-volatility.
GPRS	General Packet Radio Service – It is an always on wireless technology used by GSM (Global System for Mobile) networks which enables Internet and other data communication.
GSM	Global System for Mobile (originally “Groupe Speciale Mobile”) A mobile phone standard capable of both voice and moderate speed data traffic and SMS text messaging. Also referred to as “2G”, “2.5G”, or “2.75G” according to the capabilities of the phone being attached to the system. Gradually being replaced by the UMTS (3rd Generation or “3G”) standard that is capable of far greater data speeds.
GSPI	Gemini Serial Peripheral Interface

GVP	Generic Versatile Platform – a software platform on Gemini hardware.
HMDD	Hardware Module Design Document
IP	Internet Protocol – a protocol for communication across packet-switched networks using TCP/IP suite of protocols
In-Station	Term used for the control centre where the control system that manages one or more UVMS signs is situated.
LED	Light-Emitting Diode
MCB	Miniature Circuit Breaker – an overload protection device
MDU	Mains Distribution Unit
MEWP	Mobile Elevating Work Platform
MIB	Management Information Base
MOV	Metal Oxide Varistor
OS	Operating System
OSS	Outstation Support Server – a software application at the in-station that enables access to a range of features supported by the out-station Gemini controller. (e.g. firmware upload and download) These Siemens-specific features are not supported by the UTMC or Siespace (UVMS) applications at the in-station and therefore need to be provided separately via the OSS. Re-named from GSS to OSS to decouple it from Gemini.
PCB	Printed Circuit Board
PELV	Protected Extra-Low Voltage Circuit – a circuit having a connection to earth and in which the voltage cannot exceed ELV under normal and single-fault conditions
PSTN	Public Switched Telephone Network
PSU	Power Supply Unit
PWM	Pulse-Width Modulation
RAM	Random Access Memory
RCD	Residual Current Device
REC	Regional Electricity Company
SDS	System Design Specification
SHS	Square Hollow Section
Siespace	The software that runs on an in-station PC to control signs. Signs that run either the Siespace(UVMS) protocol or the UTMC protocol are controlled by the Siespace in-station. Other documents may use the term ‘Siespace’ to denote either the in-station or the protocol. This document uses ‘Siespace’ to denote the in-station . Siespace is now being superceded by Comet VMS Plug in.
Siespace (UVMS)	The Siespace protocol UVMS protocol. Throughout this document, ‘Siespace(UVMS)’ is used to denote the protocol
SMDD	Software Module Design Document
SMPSU	Switched Mode Power Supply Unit
SNMP	Simple Network Management Protocol – a protocol to manage network-attached devices. Utilises a MIB to represent the device being managed.
TS	Siemens Mobility Traffic Solutions
TCP	Transmission Control Protocol – one of the suite of internet protocols, TCP ensures reliable, in-sequence delivery of data from computer to computer.
TELNET	TELecommunication NETwork – an application-layer protocol to exchange TCP connections between computers

UTMC	Urban Traffic Management & Control
UVMS	Urban Variable Message Sign
VPN	Virtual Private Network – a term given to the creation of a secure, private point-to-point connection between computers that are, in reality created across open network connections or virtual circuits in some larger network

1.4 REFERENCES

No.	Reference	Title	Version	Author
1	667/UW/33930/000	Elektra UVMS System Design Document	Latest	Nick Ebsworth, Werner Poppleman, Martin Cable, Fiona Foy, Kevin Napper, Mark Retallack, Paul Weston, Kevin Wass.
2	667/HB/33930/000000	Production Test Requirements Specification for ELEKTRA - UVMS	Latest	K.W. Pöppelmann
3	667/HB/31760/000	GVP Reference Manual	Latest	Mark Retallack/Jim Ballantine
4	667/HB/31760/100	Outstation Support Server Handbook	Latest	Mark Retallack/Jim Ballantine
5	667/SA/33950/000	Display Modules & Lantern HMDD	Latest	K.W. Pöppelmann
6	667/SA/33963/000	Serial Lantern Module HMDD	Latest	C.Rabe
7	667/HB/32600/000	Gemini^2 Traffic Outstation Handbook	Latest	Paul Cox, Eric Burdis, Jim Ballantine, Mark Retallack
8	ISBN 978 0 11 551958 1	Safety at Street Works and Road Works	Latest	Department for Transport
9	667/CI/44010/000	Drawing - Multipole Spacing and Brackets	Latest	K. Wass

2 PRODUCT GENERAL DESCRIPTION

Elektra is a family of LED variable message signs. They have been designed for use as traffic information signs and for car park guidance.

Multipole Message Sign

Monopole (Cantilever)
Car Park Guidance Sign

Figure 1 – Typical Elektra Signs

A web browser interface is employed for configuration, support and maintenance, which allows these functions to be performed both remotely and locally. This is achieved by utilizing the Siemens Outstation Support Server (OSS) to manage Elektra VMS alongside existing Gemini UTMC outstations. For local connection either a cable or a Bluetooth connection can be used. Configuration changes made at the site can be automatically up-loaded to the OSS, ensuring that a fully up to date set of configurations is maintained.

Advanced fault monitoring is incorporated, offering a large range of fault indications which includes monitoring of individual pixels.

Elektra is available as a traditional multipole (2 poles) installation or as a choice of two Monopole designs. A simple monopole (Stanchion) design is available or a Cantilever structure which incorporates elevation adjustment (± 5 degrees).The enclosures have been designed for easy installation and access, with rear access to all components through doors fitted with retaining stays.

Elektra can also provide dynamic guidance by employing directional arrows that can work in conjunction with text legends.

The following display variants are available:

- 100mm yellow
- 100mm red/green
- 160mm yellow
- 160mm red/green
- 200mm Graphical arrow (Yellow)
- 240mm yellow
- 320 mm yellow
- 320mm Graphical arrow (Yellow)

Note: all characters in a sign must be the same size (height).

All displays have a wide viewing angle which makes installation alignment less critical and improves visibility across the carriageway.

Figure 1 shows typical Elektra display configurations

				TRAFFIC INFORMATION SIGNS (TI)							
				Number of Characters							
				9		12		15		18	
				Cantilever	Multi-pole	antilever	Multi-pole	Cantilever	Multi-pole	Cantilever	Multi-pole
CHARACTER SIZE (mm)	100	LINES	2	Y	Y	Y	Y	Y	Y	Y	Y
			3	Y	Y	Y	Y	Y	Y	Y	Y
			4	Y	Y	Y	Y	Y	Y	Y	Y
			5	Y	Y	Y	Y	Y	Y	Y	Y
			6	Y	Y	N	N	N	N	N	N
	160	LINES	2	Y	Y	Y	Y	Y	Y	Y	Y
			3	Y	Y	Y	Y	Y	Y	Y	Y
			4	Y	Y	Y	Y	Y	Y	Y	Y
			5	Y	Y	Y	Y	Y	Y	Y	Y
	240	LINES	2	Y	Y	Y	Y	N	Y	N	Y
			3	Y	Y	Y	Y	N	Y	N	Y
			4	Y	Y	Y	Y	N	Y	N	Y
			5	Y	Y	Y	Y	N	Y	N	Y
	320	LINES	2	N	Y	N	Y	N	Y	N	Y
			3	N	Y	N	Y	N	Y	N	Y
			4	N	Y	N	Y	N	Y	N	Y

				CAR PARK SIGNS (CPGS)			
				Number of Characters			
				6		12	
				Cantilever	Multi-pole	Cantilever	Multi-pole
CHARACTER SIZE (mm)	100	LINES	2	Y	Y	Y	Y
			3	Y	Y	Y	Y
			4	Y	Y	Y	Y
			5	Y	Y	Y	Y
			6	Y	Y	Y	Y
	160	LINES	2	Y	Y	Y	Y
			3	Y	Y	Y	Y
			4	Y	Y	Y	Y
			5	Y	Y	Y	Y
			6	Y	Y	Y	Y
	240	LINES	2	N	Y	N	Y
			3	N	Y	N	Y
			4	N	Y	N	Y

Figure 2 – Typical Elektra Display Configurations

Note

Display configurations shown in Figure 2 should be taken as a guide only. Some configurations may not be available in all areas of the country (e.g. in areas of high wind speed) or in all configurations (e.g. with and without Top Banners). Also, none of the Simple Mono-pole (Stanchion) configurations are shown as the range of these is particularly sensitive to location and ground conditions. Please contact Siemens Poole for advice on any particular installation / requirement.

Graphical arrows are normally only available on Gar Park Guidance Signs. At the time of writing a maximum of 8 'displays' are possible. In this context –

- Each text 'window' counts as a single 'display', regardless of the number of characters
- Each graphical arrow counts as a single 'display'

Therefore a maximum of four car park displays with individual graphical arrows are possible. Clearly other combinations within the overall limit of 8 'displays' are possible and will be site specific. Contact Siemens Poole for further clarification if required.

Support is provided for a wide range of communications devices and both UTMC and Siemens UVMS protocols can be used for communication with the Instation. The UTMC VMS compliant In-station communicates via SNMP v1 over IP established via an Ethernet link or a PPP connection. The In-station communicates with the sign using a "poll-and-response" method, with exceptions. The Elektra sign implements UTMC MIB version 3.01. Instation instructions to the VMS are routed via the MIB. The In-station defines an SNMP Manager which communicates with an SNMP Agent in GVP.

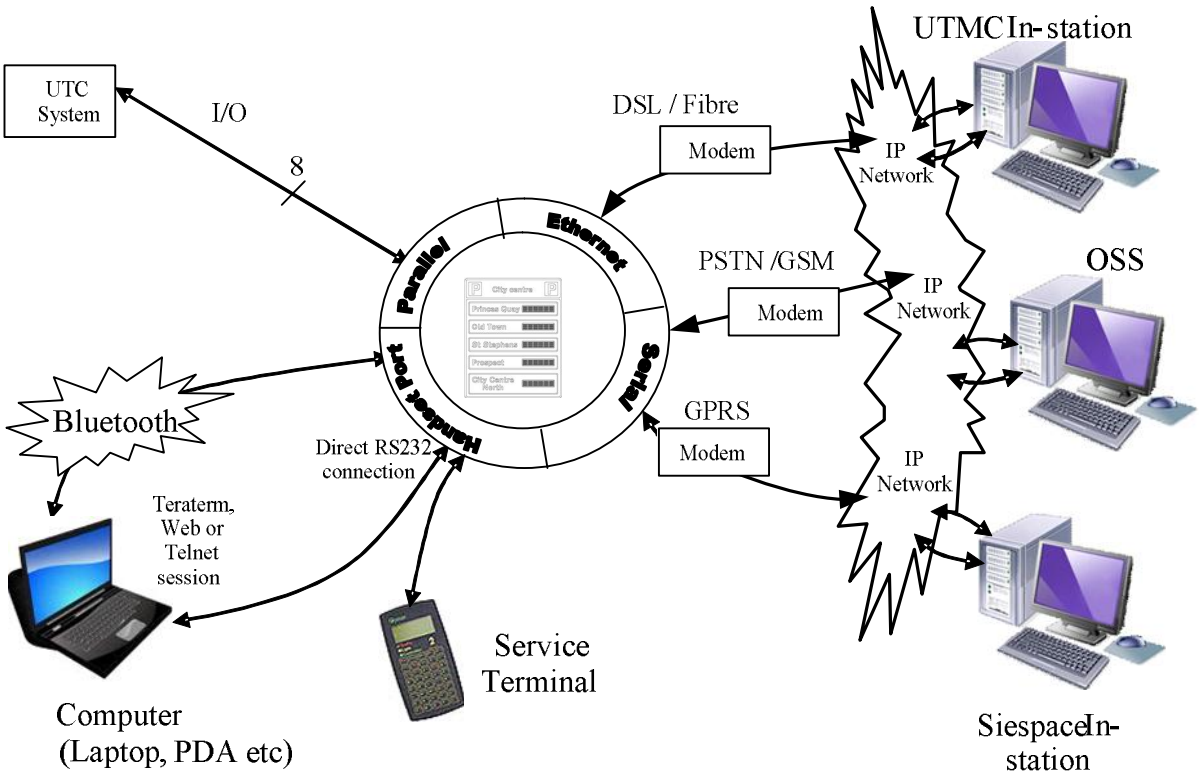


Figure 3 - System Communications Overview

3 CE AND PERFORMANCE

3.1 BS EN 12966-1

The Elektra Sign is CE marked in accordance with BE EN 12966-1:2005 +A1:2009.

A copy of the EC-Certificate of Conformity, which includes details of the relevant performance classes achieved, is included as Appendix F of this document

3.2 SUMMARY OF KEY PERFORMANCE CHARACTERISTICS

Optical Performance in accordance with BS EN12966-1			
	Yellow	Red	Green
Colour	C2	C2	C2
Luminance	L3	L3	L3
Luminance ratio	R3	R3	R2
Beam width	B3 (20 degrees)	B3 (20 degrees)	B3 (20degrees)
Uniformity	PASS	PASS	PASS
Visible Flicker	PASS	PASS	PASS
Ingress Protection		IP55	
Operating Temperature Range		-15 to + 60 degrees C	

3.3 EMC PERFORMANCE

The product is tested in accordance with the requirements of BS EN 50293:2001 “Electromagnetic Compatibility Road Traffic Signal Systems Product Standard”.

3.4 ROHS COMPLIANCE

This product is not RoHS compliant within the terms of the RoHS Directive 2002/95/EC

3.5 WEEE DIRECTIVE

This product meets the requirements of the WEEE directive – emphasising re-use in order of:

- Appliance
- Components
- Sub-Assemblies
- Consumables

Where re-use is not possible, the design incorporates high levels of recovery and recycling.

3.6 LED AND LASER CLASSIFICATION

LEDs in this product comply with Class 1M of EN 60825-1- This class is safe for viewing directly with the naked eye, but may be hazardous to view with the aid of optical instruments. In general, the use of magnifying glasses increases the hazard from a widely-diverging beam (eg LEDs and bare laser diodes), and binoculars or telescopes increase the hazard from a wide, collimated beam (such as those used in open-beam telecommunications systems).Radiation in classes 1 and 1M can be visible, invisible or both. No warning label is required on the product.

3.7 QUALITY AND RELIABILITY

It is standard Siemens design policy to ensure a reliable product, that wherever possible no parts are stressed at greater than 50% of their rated capacity in normal use. Under fault conditions (e.g. short circuits in cables) some parts may be stressed at more than 50%, but will always remain within their ratings at 85C.

3.8 SUPPORTED CHARACTER SET

The following characters are supported on Elektra signs -

A – Z (Upper Case Only)

[	]	\	space	_	!	“	%
&	‘	(	)	+	,	-	.
/	:	;	<	>	=	?	*

0 - 9

4 SAFETY REQUIREMENTS

4.1 SAFETY OF MAINTENANCE PERSONNEL

In the interests of health and safety, when using or servicing this equipment the following instructions must be noted and adhered to:

(i) Only competent and/or supervised personnel with relevant technical knowledge and experience, who are also familiar with the safety procedures required when dealing with modern electrical/electronic equipment are to be allowed to use and/or work on the equipment. All work shall be performed in accordance with the Electricity at Work Regulations 1989 or the relevant local, state and government regulations.

(ii) Such personnel must take heed of all relevant notes, cautions and warnings in this Handbook and any other Document or Handbook associated with the equipment including, but not restricted to, the following:

(a) The equipment must be correctly connected to the specified incoming power supply.

(b) The equipment must be disconnected/isolated from the incoming power supply before removing any protective covers or working on any part from which the protective covers have been removed.

(iii) Any power tools must be regularly inspected and tested.

(iv) Any ladders used must be inspected before use to ensure they are sound and not damaged. When using a ladder, before climbing it, ensure that it is erected properly and is not liable to collapse or move. If using a ladder near a carriageway, ensure that the area is properly coned and signed.

(v) Any personnel working on site must wear the appropriate protective clothing, e.g. reflective vests, etc. When working on the sign to replace modules etc, it is recommended that the Mains Supply to the sign be switched off and the master switch locked in the ‘off’ position.

Working on signs frequently involves working at height. In order to carry out such work an operative will require at least one of the following sector scheme competencies in addition to those mandatory for their occupation:

Found05/2	Use of steps and ladders
Found 05/3	Erection of Scaffold Towers (If to be used)
Found05/1	Mobile Elevating Work Platforms (If to be used)

If Mobile Elevating Work Platforms are to be used the appropriate training and assessment must be carried out before hand.

The following task based Risk Assessments and Method Statements should also be used as appropriate:

Risk Assessments

- H001 Using Ladders / Steps
- H002 Using MEWPs (Cherry Pickers)
- H003 Using Tower Scaffolds
- H005 Working at Height

Method Statements

- PMS – Working at heights
- PMS – The use of work positioning equipment

Regulation 14 of the Electricity at work regulations should also be carefully considered. This states that:

No person shall be engaged in any work activity on or so near any live conductor (other than one suitably covered with insulating material so as to prevent danger) that danger may arise unless –

a) It is unreasonably in all the circumstances for it to be dead, and;

b) It is reasonable in all the circumstances for him to be at work on or near it while it is live, and;

c) Suitable precautions (including where necessary the provision of suitable protective equipment) are taken to prevent injury.

If working live is to be carried out the related task based risk assessments and method statements must be used. These are:

Risk Assessments

- P006 Live Working

Method Statements

- PMS Live Working
- Terminating Supply Tails (live working)

When carrying out work on these signs, as part of our risk assessment we must consider if we will be putting vehicle occupants or pedestrians in a hazardous situation. We should consult the following risk assessments and method statements:

Risk Assessments

- T001 Vehicle Parking on Roads (except Motorways & High Speed Roads)
- T004 Traffic Management - All Purpose & High Speed Roads

Method Statements

- PMS Working on high-speed roads
- PMS Working on all-purpose roads

It may be that your risk assessment dictates that traffic management is required. If this is the case a competent persons must plan and erect the traffic management with reference to the ‘Safety at Street Works and Road Works’ Red Book and Chapter 8.

4.2 ELEKTRA WORKING AT HEIGHT PROVISIONS

Depending on the scale and type of the work to be carried out, the risk assessment should dictate if a MEWP or platform will be required. If the work can be carried out using ladders, the current harnesses, anchor points and ladder straps should be used.

Ladder Strap tie-offs are visible on opening of the enclosure as shown in Figure 4. These can be used to ensure that the ladder is securely strapped to the sign. Alternatively the ladder can be tied to the frame as shown in Figure 5.

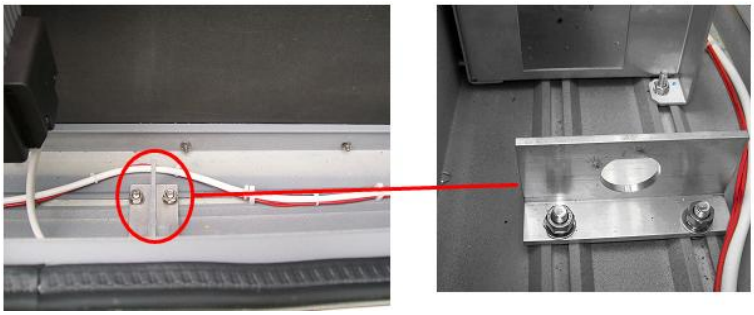


Figure 4 - Ladder Strap Tie-Off

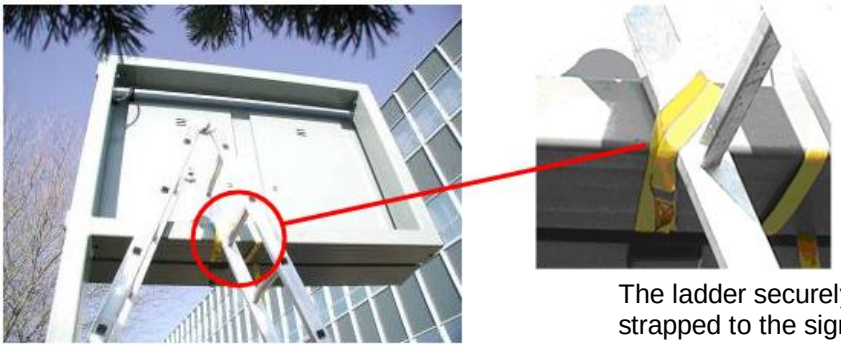


Figure 5 - Ladder Tie-Off to frame

A work positioning bar is provided to allow the harness lanyard to be attached to the sign. Figure 6 shows how the most recent lanyard grips the bar effectively.

Figure 6 - Work Positioning Bar

If heavy items such a transformer or PSU are to be removed from the sign, the appropriate holes in the mounting brackets should be used in conjunction with a lanyard in order to safely lower them from the sign.

5 ELEKTRA EQUIPMENT

5.1 ELEKTRA ENCLOSURE EXTERIOR

Figure 7 and Figure 8 show an external view of the sign infrastructure with the sign elements indicated.

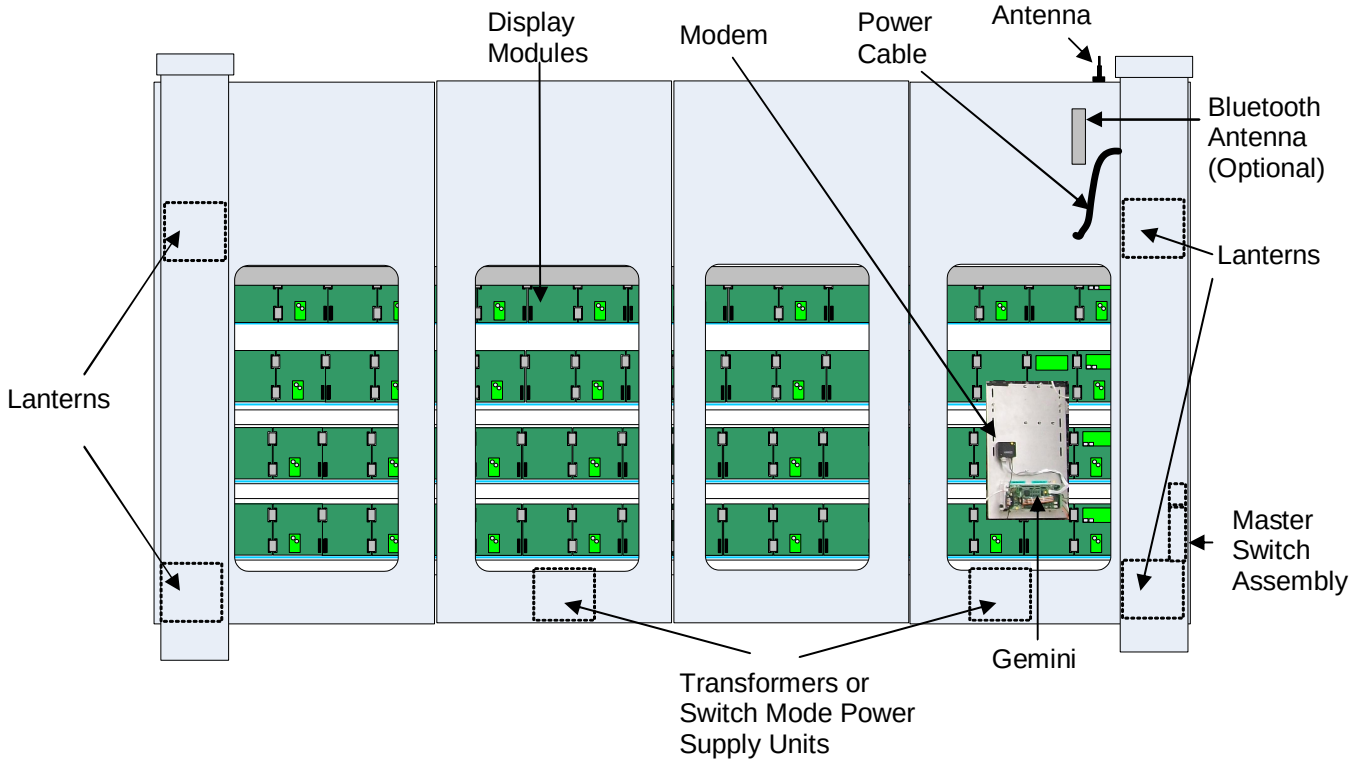


Figure 7 - Typical Traffic Information Sign Exterior View

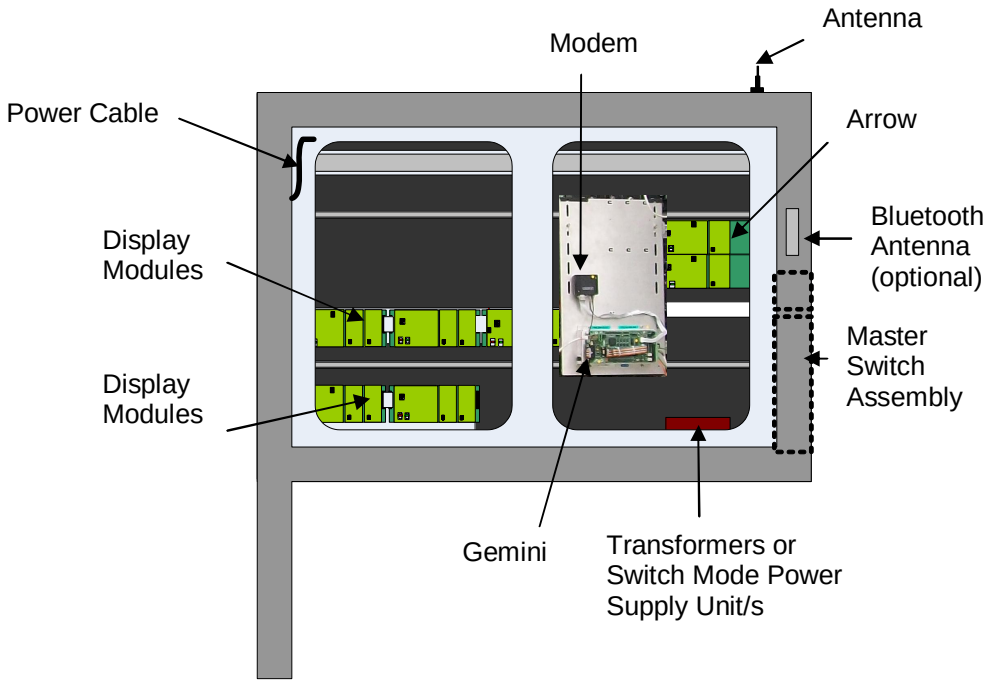


Figure 8 - Typical Car Park Guidance Sign Exterior View

The design of the enclosure, with rear fitting doors, allows easy access for maintenance purposes. The enclosure offers protection to IP55 and allows operation over the following temperature and humidity ranges:

- Temperature range:-15°C to +60 ^{o}C
- Humidity: 0 to 100% condensing

5.1.1 Mounting options

There are three possible mounting options:

- Monopole (Cantilever sign)
- Simple Monopole (Stanchion sign)
- Multipole

Monopole (Cantilever sign)

The sign is attached to a Cantilever pole. The pole is attached to the foundation with four studs, and incorporates azimuth (rotational) adjustment of ± 5 degrees. The top of the cantilever is formed into a frame to support the sign. On the left and right sides of the sign there are two plates that secure the sign to the frame. The top plate is called the swinging arm and the lower plate the lower pivot. The swinging arm allows the sign to be tilted in the vertical plane (elevation adjustment of up to 1.5 degrees (up) or 5 degrees down). There is a hole at the top of the cantilever to accept conduit. The power cable is fed through this conduit and the hollow inside of the cantilever to ground level.

See Section 8.2 of this document for detailed installation instructions

Simple Monopole (Stanchion sign)

The base of the sign enclosure is attached directly to the top of the rectangular hollow section pole. The pole is attached to the foundation with four nuts. Rotational adjustment (± 5 degrees) of the sign is possible after installation, but adjustments to elevation are not possible.

See Section 8.3 of this document for detailed installation instructions

Multipole

The sign is attached to two circular cross section poles, one of which may be belled (restricted to certain sign sizes – contact Siemens Poole for details) to house a secondary isolator. The poles are concreted into the foundations. The correct orientation of this type of sign relies on positioning on installation and cannot be subsequently adjusted in either azimuth or elevation.

See Section 8.4 of this document for detailed installation instructions

5.1.2 Mains Connection Options

All Elektra signs are fitted with a lockable double pole mains isolator within the Master Switch Assembly (see Section 5.2.2.1).

In order to permit sensible and safe connection / isolation of the installation, Siemens recommend the fitting of a secondary, lockable, isolator in the feeder pillar, or similar, supplying the sign.

Siemens recommendations are as follows –

- If the distance between the feeder pillar and the sign exceeds 25m a double pole isolator with MCB should be fitted. Siemens part number 667/7/44679/020 is available for this purpose.

- If the distance between the feeder pillar is less than 25m a double pole isolator without MCB may be fitted. Siemens part number 667/7/44678/000 is available for this purpose.

- Armoured cable should be used for the connection between the feeder pillar and the sign. Siemens cable, part number 667/4/88346/060 is available for this purpose.

For some multipole signs, an optional belled pole may be available.

Note	Belled pole option is only available on a limited range of multipole sign sizes. NOT available for Monopole or Simple Monopole mounted signs

In the case of a belled pole, the electricity board cut-out may be mounted on the wooden board within the pole. In this instance Siemens recommends the fitting of double pole isolator 667/7/44678/000 to permit secondary isolation of the sign at ground level.

For further detail on mains connection see section 8.5

5.1.3 Power Supply Options and Requirements

Two Power supply options are available on Elektra signs –

- Transformer
- SMPS

As standard, Elektra signs will be delivered fitted with transformers.

If a power factor corrected supply is required there is the option of using Switched Mode Power Supplies in place of the transformers.

Note	If a power factor corrected supply is required this must be specified at the time of ordering the sign.

Where Transformers are used to provide the required 24V the mains supply must comply with the following specification:

- 230V AC (+10% -13%)
- 50/60 Hz

Where Switch Mode Power Supply Units (SMPS) are used (giving an improved power factor) the mains supply must comply with the following specification:

- 100V-263V AC
- 50/60Hz

5.1.4 Power Consumption

Important

The power consumption figures supplied here are designed to permit typical useage calculations to be performed. They are NOT intended to permit design decisions on the number of transformers or SMPS required in a specific sign as other factors such as de-rating must be considered.

Module size/type (mm)	Colour	Power (Watts)	Comments	Row Drivers
100	Yellow	2.3W per character	3 character modules	Must add 1 row driver per sign row
100	Red	1.15W per character	3 character modules	Must add 1 row driver per sign row
100	Green	3.84W per character	3 character modules	Must add 1 row driver per sign row
160	Yellow	2.3W per character	3 character modules	Must add 1 row driver per sign row
160	Red	1.15W per character	3 character modules	Must add 1 row driver per sign row
160	Green	3.84W per character	3 character modules	Must add 1 row driver per sign row
240	Yellow	3.64W per character	Single character modules	Must add 1 row driver per sign row
320	Yellow	8.12W per character	1.5 character modules	Must add **2** row drivers per sign row
200 Graphical Arrow	Yellow	6.7W		Figure Includes Row Driver
320 Graphical Arrow	Yellow	6.7W		Figure includes Row Driver
Lantern	Yellow Only	20.5W per set, when on	20.5W per pair, one pair on at a time.	Figure includes row driver
Row driver	N/A	1		N/A
Sensor	N/A	1	One per sign	N/A
Gemini	N/A	8	Includes MC35i power	N/A
Heater element (wire)	N/A	102W when ON	Per Heater wire – one in small signs, but could be up to five in a large sign	N/A

Figure 9 – Typical Power Consumption of Sign Modules

Calculating the power requirement of a VMS sign is complicated by the fact that it will vary considerably depending upon the message displayed, whether the lanterns are flashing (if fitted), and the ambient conditions (temperature, brightness) at different times of the day/night.

The display power figures given in Figure 9 are calculated on the assumption that 40% of the leds (within the character) are ON at full brightness to give a realistic maximum loading per character for a text display.

It is simplest to consider the power requirements in three different areas, P1, P2 and P3 -

Background power (P1)

This is the power required by the sign control electronics (Gemini), communications equipment, etc

P1 = Gemini Power + Modem Power + Sensor board Power

Display power (P2)

This is the power required by the display elements of the sign

P2 = ((Power per character x number of characters) x number of rows) + (Power per row driver x number of rows) + (Lantern power, if fitted and ON) + (Graphical arrow power, if fitted)

Heater Power (P3)

This is the power required by the internal heater elements. The heater control in Elektra signs is 'intelligent' and is based on the current temperature and humidity within the sign enclosure. For this reason, and as the power required by heaters can be significant compared to other parts of the sign, it is sensible to choose a reasonable duty cycle for the heaters at different times of the year.

P3 = (Power per heater element (wire) x number of elements) x (percentage of time heater expected to be on)%

5.1.4.1 Example Power Calculation – Traffic Information Sign

Sign Details

4 rows x 12 (160mm) yellow characters
Lanterns fitted
2 x heater elements fitted

P1 = Gemini Power + Modem Power + Sensor board Power
P1 = 8 + 0 (Modem included in Gemini power) +1
P1 = 9W

P2 = ((Power per character x number of characters) x number of rows) + (Power per row driver x number of rows) + (Lantern power, if fitted and ON) + (Graphical arrow power, if fitted)

With lanterns OFF

P2 = ((2.3 x 12) x 4) + (1 x 4) + 0 + 0
P2 = 114.4W

With lanterns ON

P2 = ((2.3 x 12) x 4) + (1 x 4) + 20.5 + 0
P2 = 134.9W

P3 = (Power per heater element (wire) x number of elements) x (percentage of time heater expected to be on)%

For summer use, assume heaters on 1% of time, for winter use assume heaters on for 30% of time

In summer

P3 = 102 x 2 x 1%
P3 = 2.04W
In winter

P3 = 102 x 2 x 30%
P3 = 61.2W

Summary power requirements for sign

Summer, lanterns OFF = 9 + 114.4 + 2.04 = 125.44W
Summer, lanterns ON = 9 + 134.9 + 2.04 = 145.9W

Winter, lanterns OFF = 9 + 114.4 + 61.2 = 184.6W
Winter, lanterns ON = 9 + 134.9 + 61.2 = 205.1W

5.1.4.2 Example Power Calculation – Car Park Sign

Sign Details

3 rows x 6 (100mm) red/green characters
1 x 200mm Graphical arrow, yellow
1 x heater element fitted

P1 = Gemini Power + Modem Power + Sensor board Power
P1 = 8 + 0 (Modem included in Gemini power) +1
P1 = 9W

P2 = ((Power per character x number of characters) x number of rows) + (Power per row driver x number of rows) + (Lantern power, if fitted and ON) + (Graphical arrow power, if fitted)

Looking at Figure 9 the highest power is required when displaying green characters. As the default colour for a red/green car park sign is green we will calculate the power based on all characters when displaying green.

P2 = ((3.84 x 6) x 3) + (1 x 3) + 0 + 6.7
P2 = 78.82W

P3 = (Power per heater element (wire) x number of elements) x (percentage of time heater expected to be on)%

For summer use, assume heaters on 1% of time, for winter use assume heaters on for 30% of time

In summer

P3 = 102 x 1 x 1%
P3 = 1.02W

In winter

P3 = 102 x 1 x 30%
P3 = 30.6W

Summary power requirements for sign

Summer = 9 + 78.82 + 1.02 = 88.84W

Winter = 9 + 78.82 + 30.6 = 118.42W

5.2 THE ELEKTRA ENCLOSURE INTERIOR

Figure 10 shows a block diagram of an Elektra Traffic Information Sign, showing two rows of six characters, a graphical arrow and 4 lanterns.

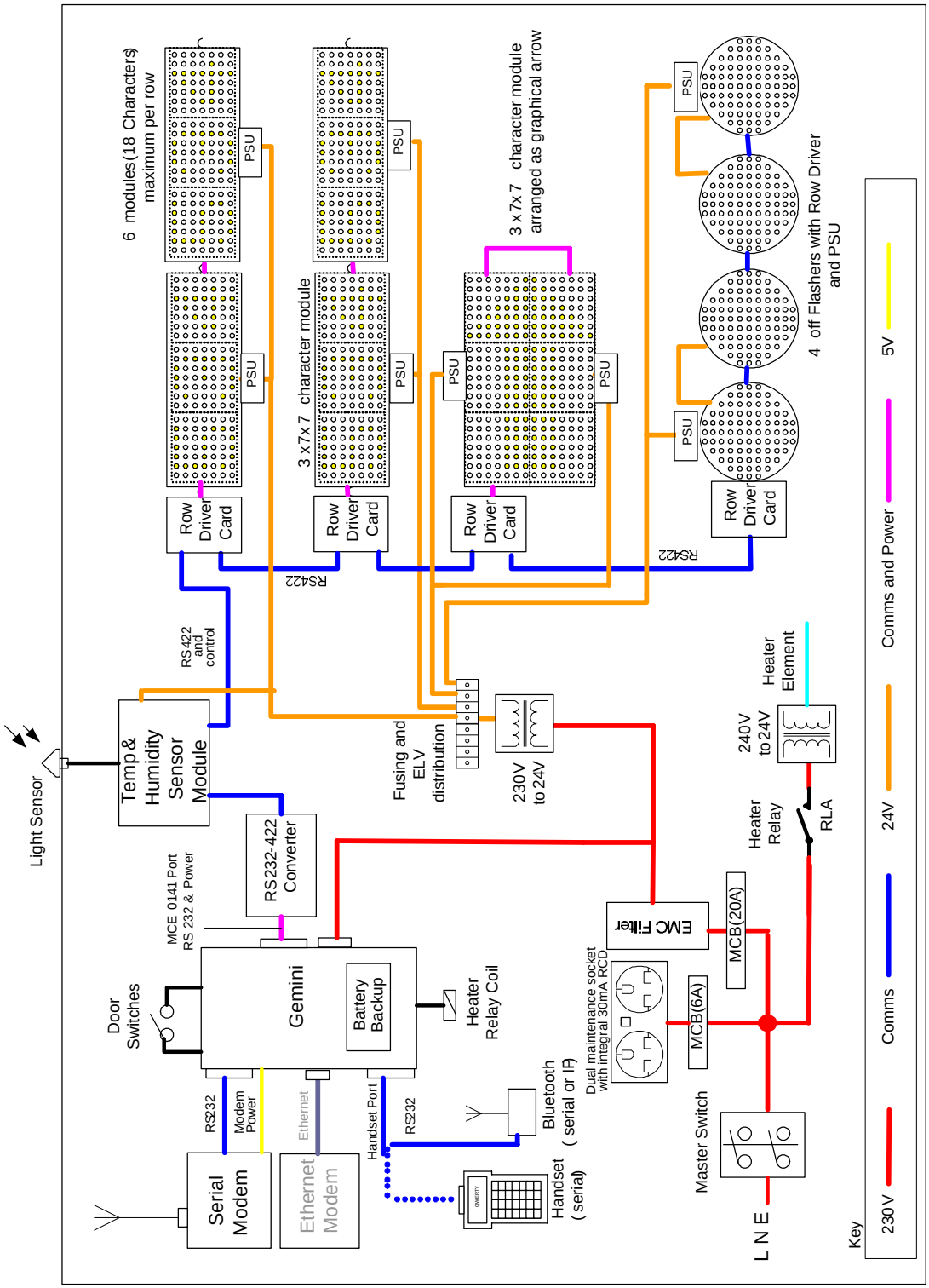


Figure 10 - Elektra Block Diagram

5.2.1 Simplified Sign block diagram

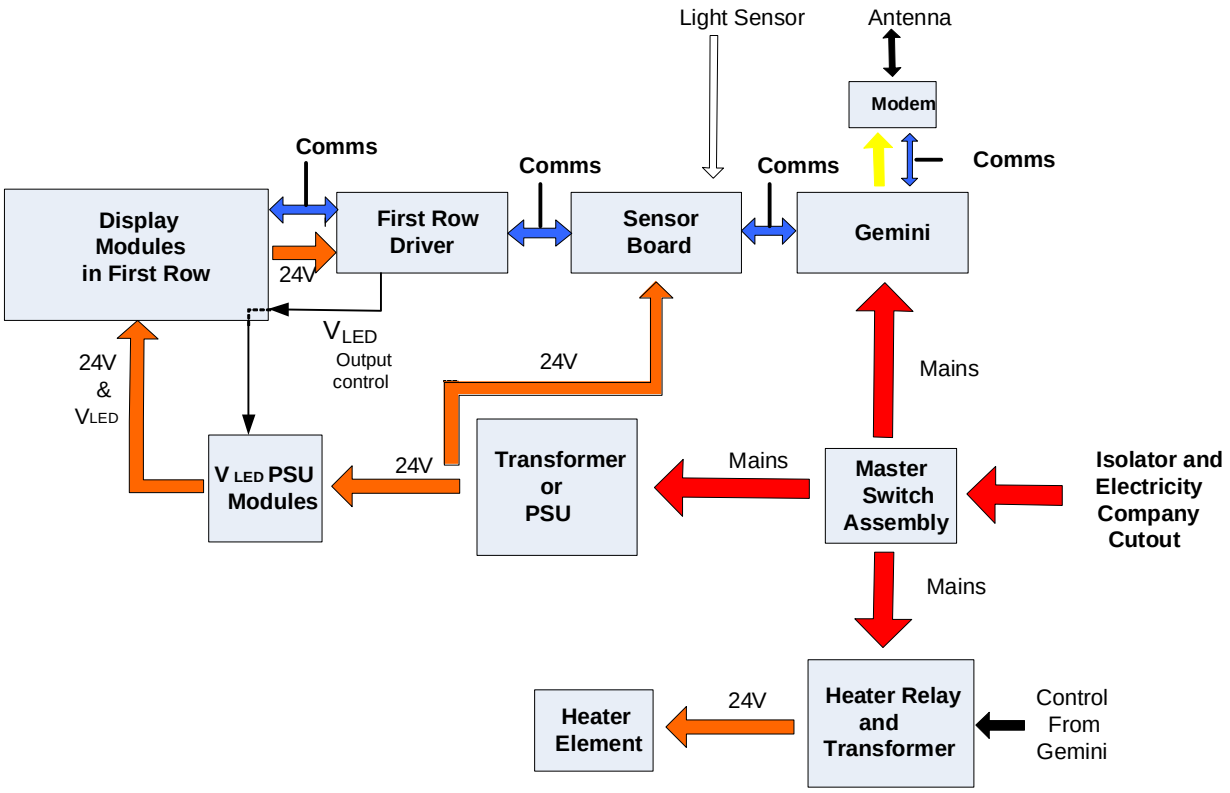


Figure 11 - Sign Block Diagram (Showing only one row and no lanterns)

The Gemini unit provides the interface to the instation via a transmission system (in this case GPRS) and controls the sign in accordance with messages received from the instation

Luminance level information comes from from the sensor board and allows the Gemini to control the display Pulse Width Modulation in order to set the display brightness appropriate to the ambient light level.

Temperature and humidity information also come from the sensor board and allow the Gemini to activate the internal heaters, as required, to minimise condensation.

When the instation sends an instruction for the sign to display a particular legend, the Gemini sends the appropriate data to control the displays via the sensor board and row drivers. Fault information passes back to the Gemini from these modules, is sent to the instation and is available through the Web Browser. Appropriate control actions are also taken by the Gemini on the basis of this fault information.

The Sensor board, Row driver modules, Display Modules and VLED PSU modules are supplied with 24V derived from either a transformer or SMPS.. In order to avoid unwanted illumination of the displays the row driver boards are able to 'remove' the VLED power from the displays. This will happen for example if the row driver looses communication with the Gemini. The Gemini provides the power supply for the Modem (12V for the MC35 GPRS Modem), and the Gemini itself gains its power from the sign Master Switch Assembly. The Heaters are supplied with 24V derived from the heater transformer.

Communication with the lantern boards (if fitted) is achieved via a row driver that is mounted on the first lantern board. CAT6 cabling connects the first lantern to the other 3 in a daisy chain. Two VLED PSU boards are required in total for the 4 lantern boards.

5.2.2 Internal sign modules

5.2.2.1 Master Switch Assembly - 667/2/44650/000 standard / 667/2/44650/001 fully populated

WARNING: The master switch assembly cover must not be removed until the supply to the master switch assembly has been isolated.

The Master Switch Assembly is fitted to the side of the sign interior. It provides the following facilities:

Double pole master power switch
Master cartridge fuse
Heater fuse
Single pole sign power switch
Maintenance socket MCB
Gemini fuse
Transformer/power supply fuse (2 additional fuses are fitted where more than 2 transformers/SMPSUs are required).
Dual maintenance socket with built in RCD protection
Mains EMC filtering
Surge protection

All live wiring within the master switch assembly can only be accessed by removing its protective cover.

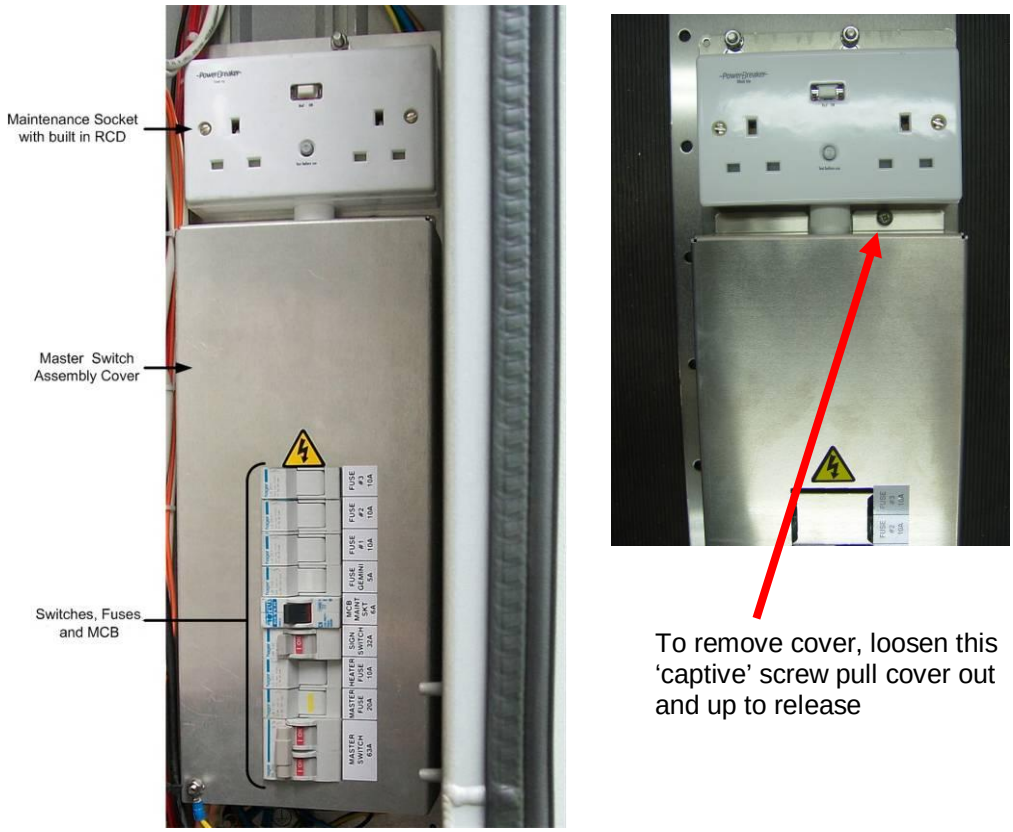


Figure 12 - The Master Switch Assembly

Figure 13 shows positions of the different elements that make up the master switch assembly. The numbering corresponds to that used in Figure 15. The Master Switch Assembly photograph has been shown horizontally to aid clarity. The standard build has 1 transformer/SMPSU fuse.
Figure 14 shows the other variant that has 3 transformer/SMPSU fuses.

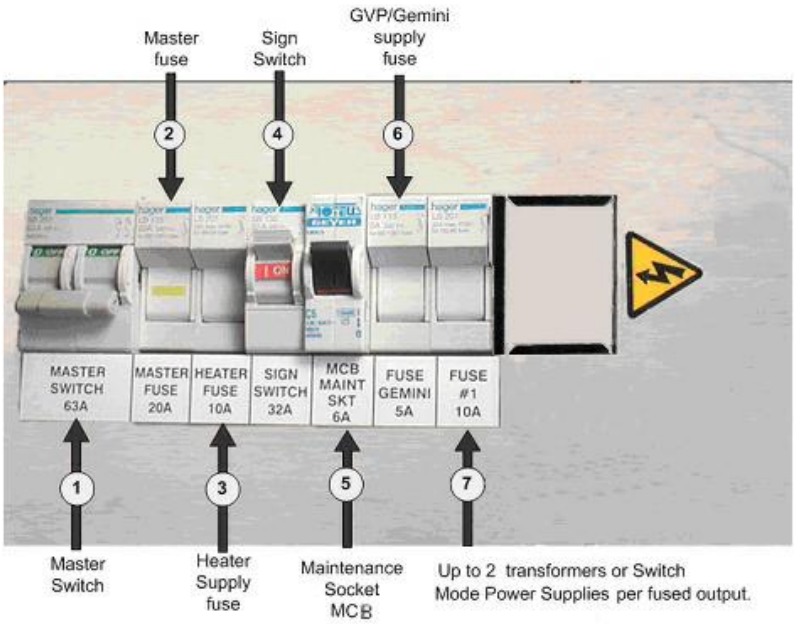


Figure 13 - Master Switch Assembly Identification – Standard (667/1/44650/000)

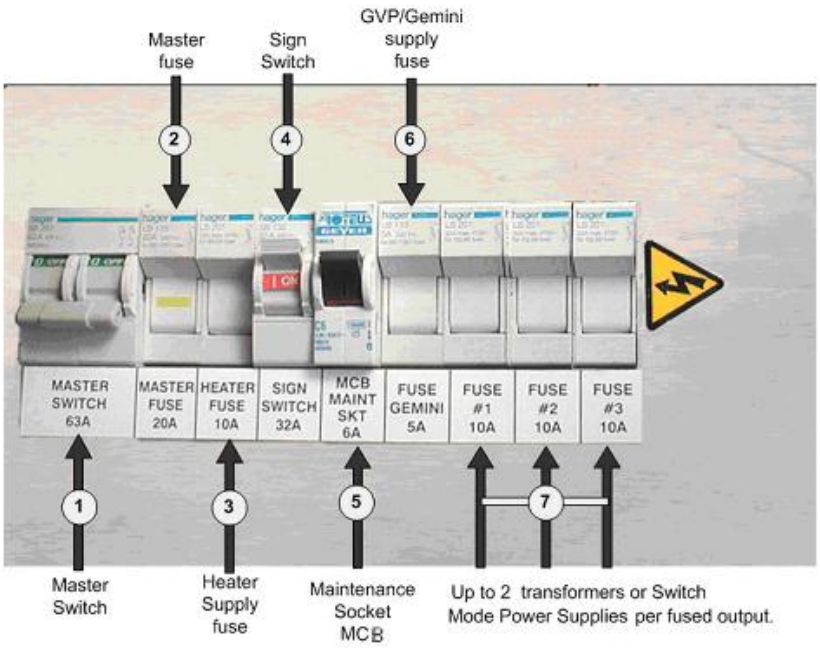


Figure 14 - Master Switch Assembly Identification – Fully populated (667/1/44650/001

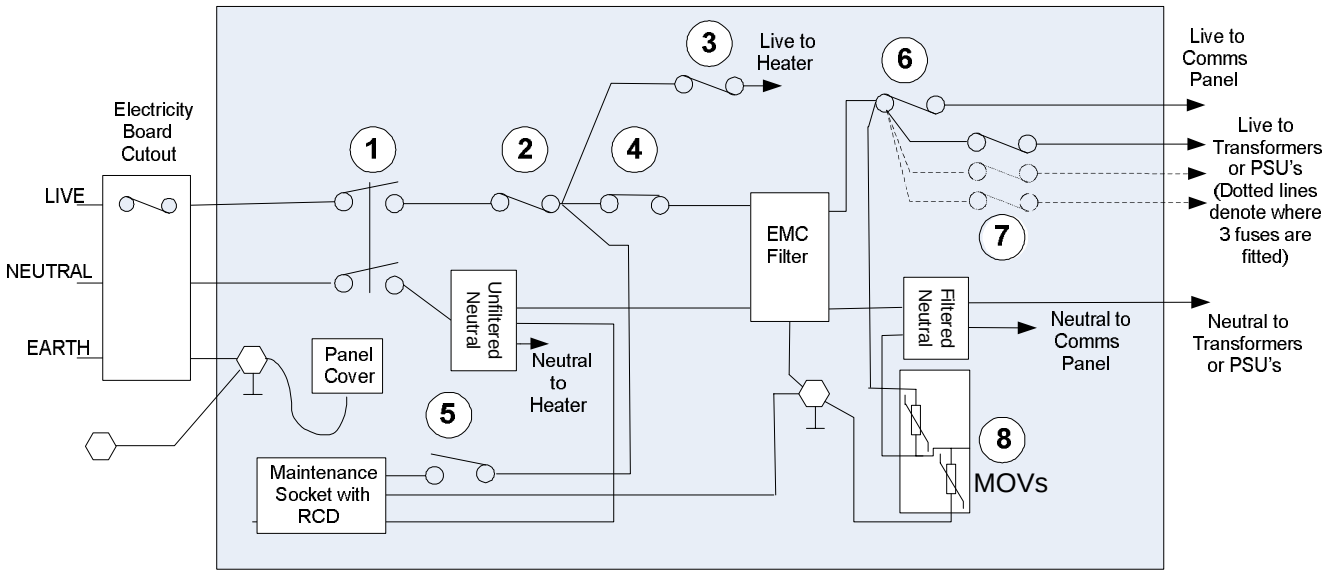


Figure 15 - Master Switch Assembly Circuit Diagram

The part numbers are given in Figure 16

	Master Switch Assembly Item	Part Number
1	Master Switch 63A	408/4/97165/002
2	Master Fuse Holder	516/4/97053/002
	Master Fuse 20A	518/4/90638/004
3	Heater Supply Fuse Holder	516/4/97064/000
	Heater Supply Fuse 10A	518/4/90352/004
4	Sign Switch	408/4/97165/002
5	Maintenance Socket MCB	516/4/97076/006
6	Gemini Supply Fuse Holder	516/4/97053/000
	Gemini Supply Fuse 5A	518/4/90638/000
7	Transformer/PSU Fuse Holder	516/4/97064/000
	Transformer/PSU Fuse 10A	518/4/90352/004
8	Lightning Protection/Varistors	516/4/00136/000
	Maintenance RCD Socket 30mA	516/4/02062/000

Figure 16 - Master Switch Assembly Part Numbers

Figure 17 shows a Standard Master Switch Assembly with the cover removed. The module containing the Metal Oxide Varistors (MOV) can be seen attached to the DIN rail. Metal Oxide Varistors are electronic components with a significant nonlinear current–voltage characteristic. When triggered, they will shunt the current created by the high voltage away from the sensitive components. In the case of ELEKTRA signs they protect the sign from high voltage transients that may appear on the mains supply. These transients could be produced by lightning for example.

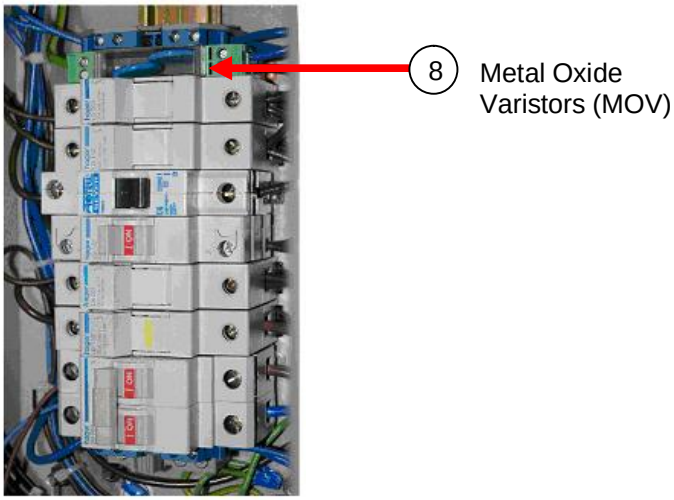


Figure 17-Master Switch Assembly with Cover Removed

5.2.2.2 500VA Transformer Assembly – 667/1/44670/000

The transformer is a 230 V a.c. to 24 V a.c. 500 VA transformer. It is part of an assembly which includes an integral mounting plate that secures it to the sign enclosure. It is heavy with a mass of approximately 10 kg and care should be taken when fitting or removing it. The transformer has four individually fused outputs fixed to its top plate and four common return terminals.

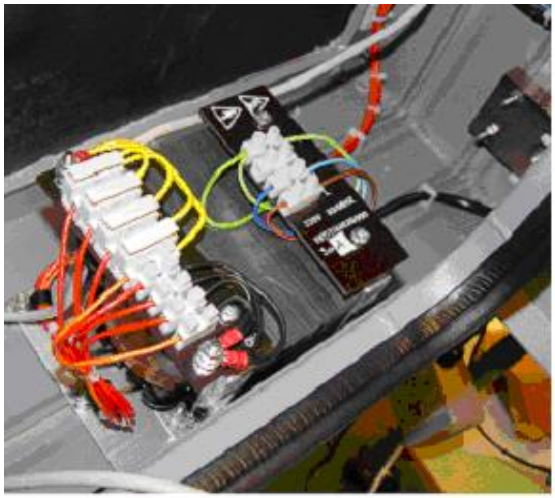


Figure 18 - Power Supply Transformer

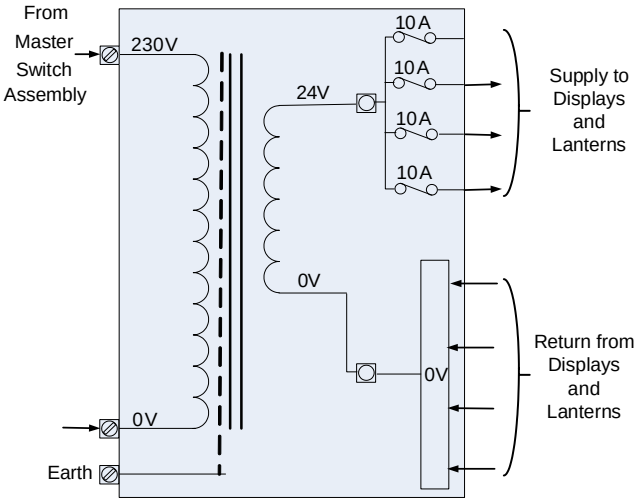


Figure 19 - Transformer Circuit Diagram

IMPORTANT

Note: Although one end of the transformer secondary winding is labelled as '0V', it should never be connected to ground (i.e. any metalwork within the sign), as the supply is referenced to ground after rectification.

The transformer mounting plate incorporates a hole so that a lanyard can be used when removing the assembly from the sign. This enables it to be lowered to the ground safely, avoiding creating a hazard for pedestrian.

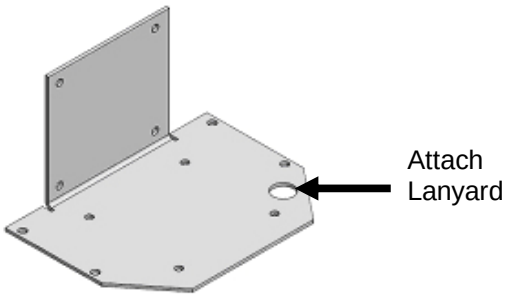


Figure 20 - Transformer mounting plate with lifting hole

5.2.2.3 Switched Mode Power Supply Assembly – 667/1/44675/000

Where a Power Factor corrected mains input is required there is the option that the 24V supply is derived from PSU (DC) modules rather than transformers. These are mounted across the base of the sign enclosure. The power supply is cooled by natural convection and is mounted on a bracket to allow air flow up through the unit. The PSU is a lightweight 24V DC switch mode unit as shown in Figure 21. It has four individually fused outputs fixed to its bracket and terminals on its front face for 24V returns and mains connections.

10A fuses are used – 518/4/97065/000.

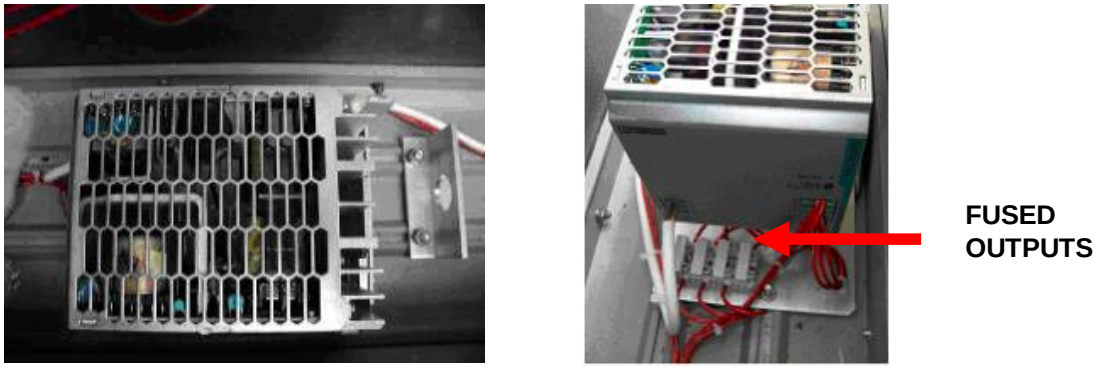


Figure 21 - Switch Mode Power Supply

The PSU mounting plate incorporates a hole so that a lanyard can be used when removing the assembly from the sign, so that it can be lowered to the ground safely.

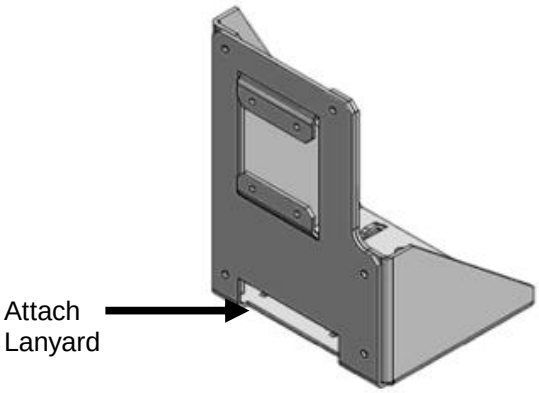


Figure 22 - PSU mounting plate with lifting hole

5.2.2.4 The Comms Panel – 667/1/44630/000 (Includes Gemini)

The Comms (Communications) Panel is a sliding aluminium panel upon which the Gemini unit and modem are mounted. These two devices allow communication with the instation. The modem is normally powered from the Gemini. The Gemini connects with the sensor module using an RS422 interface over CAT5 cabling. The sensor module then connects to the first row driver using the same type of interface.

The Gemini also connects with the heater and door switches via its IO interfaces.

The Comms Panel has been designed to accept other comms/additional equipment required to be mounted within the sign.

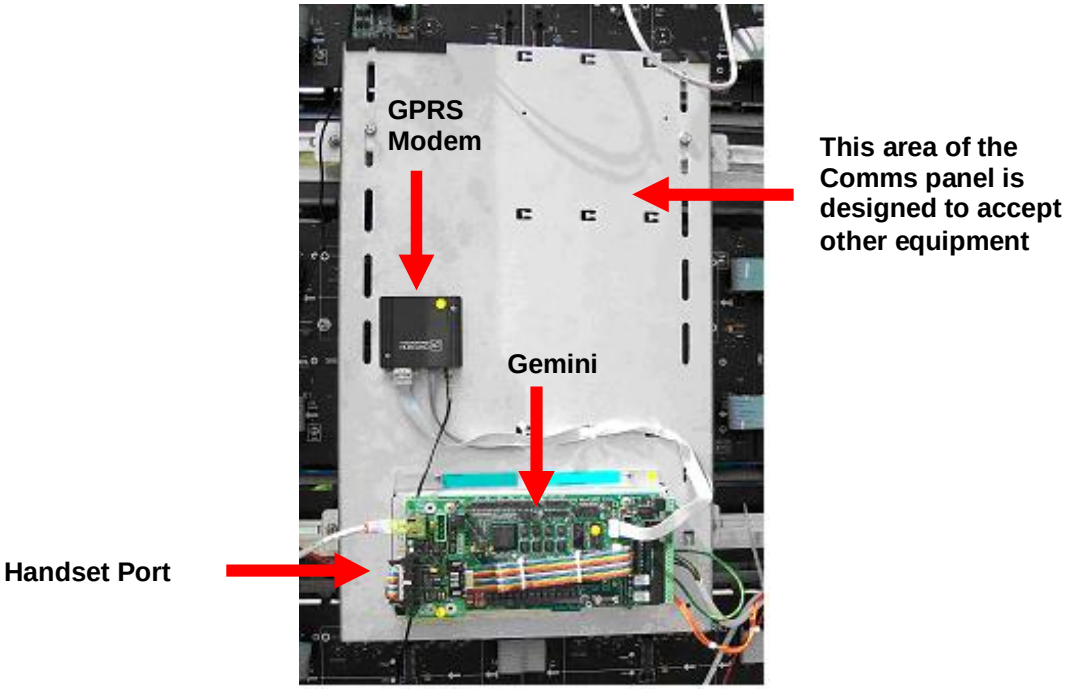


Figure 23 - Comms Panel

The Comms panel comprises:

- ELEKTRA Gemini
  - RS232/422 converter (Mounted as part of Gemini unit and powered from power pins on the Gemini serial port)
  - Handset Port (allows connection of engineers terminal)
  - Optional IO card for UTC controlled applications requiring 8 Input and 8 output lines
  - Battery Backup for Gemini and modem
- Optional Modem for in-station connectivity – one of:
  - DSL modem (Ethernet)
  - Fibre modem (Ethernet)
  - GPRS modem (Serial)
  - GSM Modem (Serial)
  - PSTN modem (Serial)
  - Other modems may be used as required
- Interface to enclosure door switches
- Interface to heater control relay

The Comms panel can be moved sideways to improve access to the boards behind it. This is done by slackening its four mounting nuts. The position of one such nut is shown in Figure 24.

The position of one of the four nuts that should be slackened in order to adjust the position of the panel.

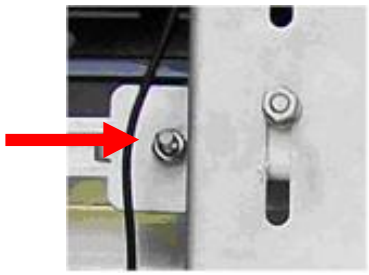


Figure 24 - Comms Panel adjustment

5.2.2.5 The Antenna

The antenna is used when the modem is a wireless module such as GSM or GPRS. It is mounted on a removable plate at the top of the Elektra sign. The plate can be used with a variety of antenna designs through simple modification.

Figure 25 - The Antenna

The Light Sensor – 667/1/31259/001

The ambient light sensor is mounted on the same plate as the antenna in the top surface of the sign. The light sensor cable connects into the Elektra sensor module.

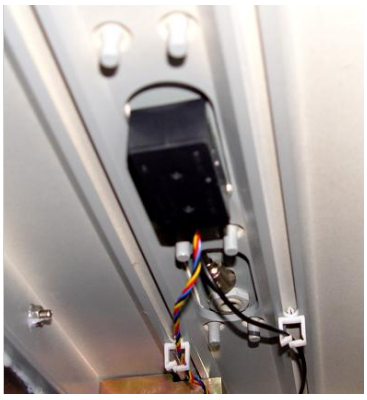


Figure 26 - The Light Sensor

The ambient light level is periodically read from the light sensor by the Sensor board. The current light level is resolved into one of 5 luminance level bands.
Luminance control of the displays is achieved by PWM (Pulse Width Modulation) control of the current supply to the LEDs and is dependent on either the luminance level band or luminance override instructions from the In-station (if the sign has been configured to allow the override).

IMPORTANT

Note: As the characteristics of the different types of display are not all the same, the Gemini needs to be configured to take account of the actual displays fitted to the sign. If this is not done, the display intensity levels may be incorrect. This operation is described in section 11.5 with further information on the web pages used given in sections 13.11.4 and 13.11.5.

5.2.2.6 The Row driver Module Assembly – 667/1/33980/002

The row driver module produces the signalling that drives the LED displays. It is fitted to the rear of the display boards, on the far right of each row when looking from the rear of the sign. Each row has a separate row driver module. The row drivers are connected together with CAT5 cabling. The RJ45 connectors are designated as 'IN' and 'OUT', and the cabling must be carried out taking account of this. These boards are auto addressed by the Gemini unit. If a rotary switch is present on the board this should be set to '0'.

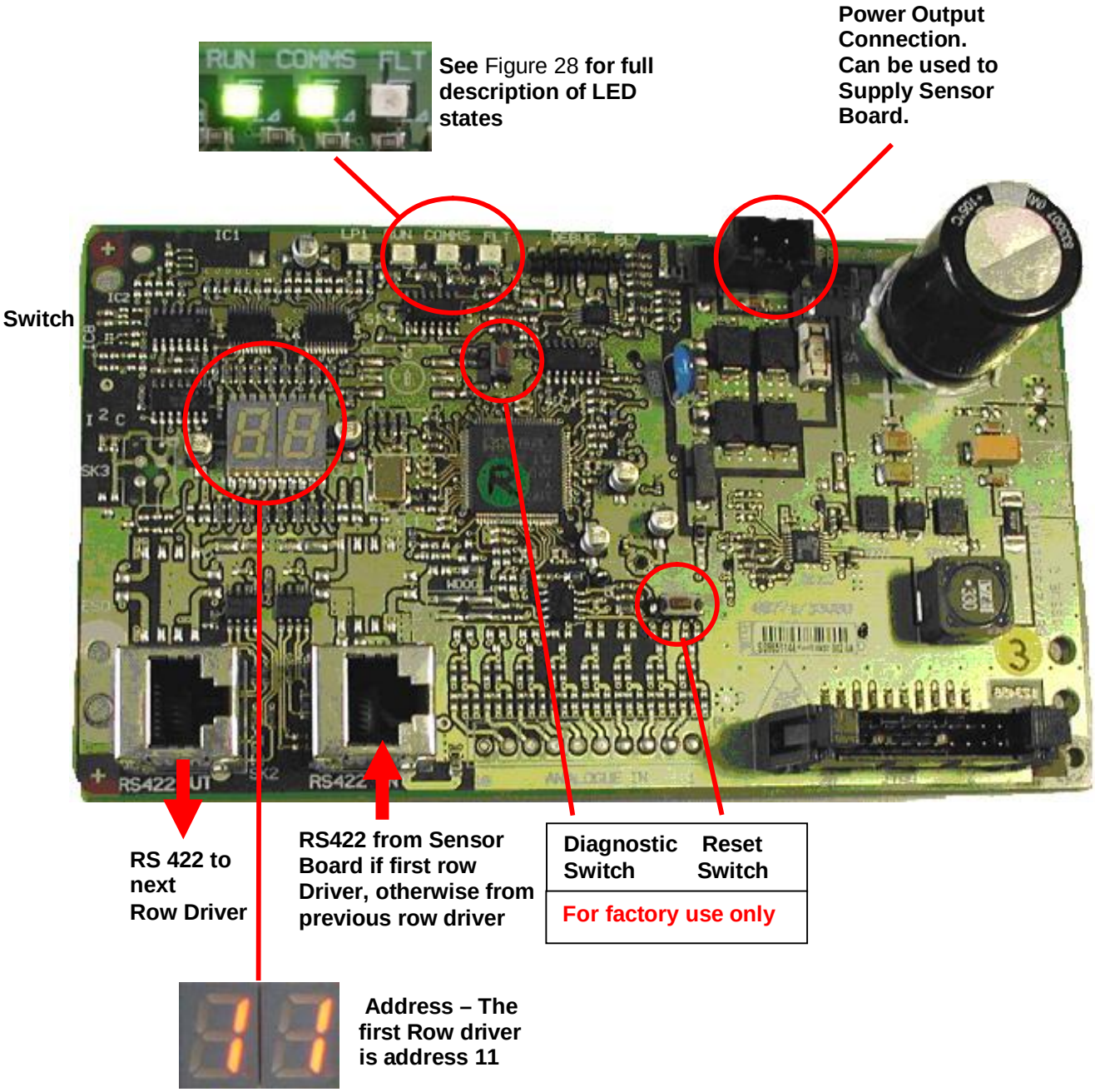


Figure 27 - Row Driver Module (Front)

LED	Type	Meaning	Possible Cause
Fault	On	Fault	Fault present. Fault is indicated until reported over GSPI.
	Flash	Invalid address	Invalid address
	Off	No fault	No fault or no power
Run	Flash	Normal operation	Normal operation
	Off	No power	No power or fault
Comms	Flash	Comms active	GSPI comms present
	Fast flash	Downloading	GSPI download in progress
	Off	No GSPI comms	GSPI comms lost

Figure 28 - Row Driver LED States

5.2.2.7 The Row Driver 7-Segment Display

The 7-segment display is driven to reflect the status of the board and any associated display or lantern boards. The following figures show the state of the display when specific circumstances occur:

Local PSU failure or held in reset

If the power if off, there is a local PSU failure or the board is held in reset the display remains blank as shown below in Figure 29.

Figure 29 – 7- Segment blank

Unconfigured

If the board has powered up and is awaiting allocation of its address the display will be in the state indicated below in Figure 30.

Figure 30 – 7- Segment dashes

Configured – normal working

The board is allocated an address from the Gemini. The allocated addresses start from 16 (Decimal) and are displayed in hexadecimal, as shown below in Figure 31(address 17 in decimal).

Figure 31 – 7- Segment Address Digits

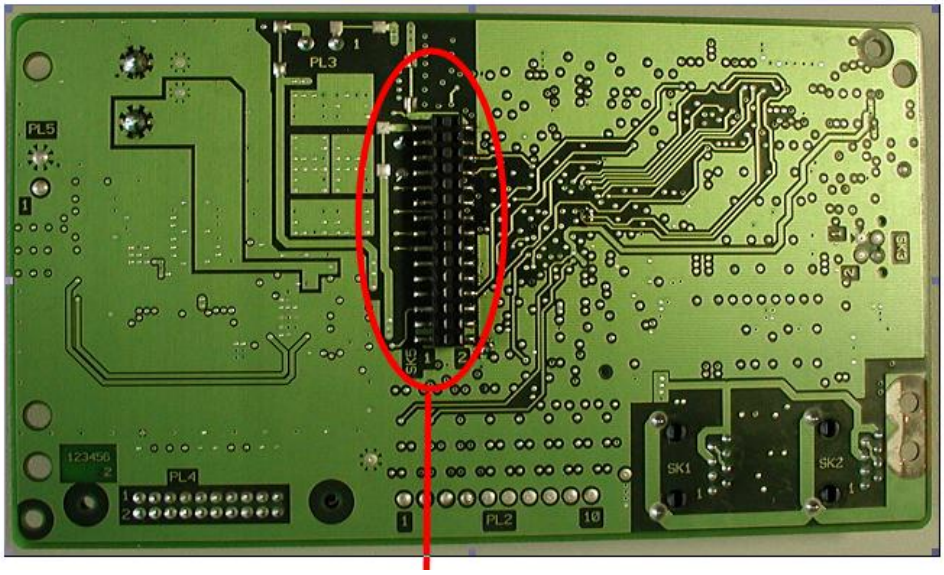
It should be noted that these displays output in Hexadecimal, which means that 11 is not Eleven but Seventeen in decimal.

16	1
1	1

Figure 32 – Hexadecimal Address

Figure 32 shows that we have (1x1) + (1x16) in Decimal, which equals 17.

Figure 33 below shows the rear of the row driver module. The connector shown passes power and communications between the row driver and display boards.



Connection to Display board.

Figure 33 - Row Driver Module (Rear)

If the row driver looses communication with the Gemini or the Display modules, it is able to ‘disconnect’ the power from the displays.

5.2.2.8 Sensor module – 667/1/33980/001

The sensor module performs two functions; it provides environmental sensing and communications conversion between the Gemini and row driver modules. For the latter function it must always be connected directly to the Gemini unit (RS232/422 converter board). The sensor module has a temperature sensor, humidity sensor and a connector to accept the light sensor. The sensor module and the row driver modules look very similar as they use the same PCB. The part number distinguishes between the two but a quick means of identification is the lack or presence of the connector on the underside of the PCB. The sensor module doesn't have this connector fitted. Once the addresses have been successfully allocated, the sensor module always has the address of 10 (HEX). The output RJ45 connector on the sensor board must connect to the Row Driver board on the first row. These boards are auto addressed by the Gemini unit and if a rotary switch is present on the board this should be set to '0'.

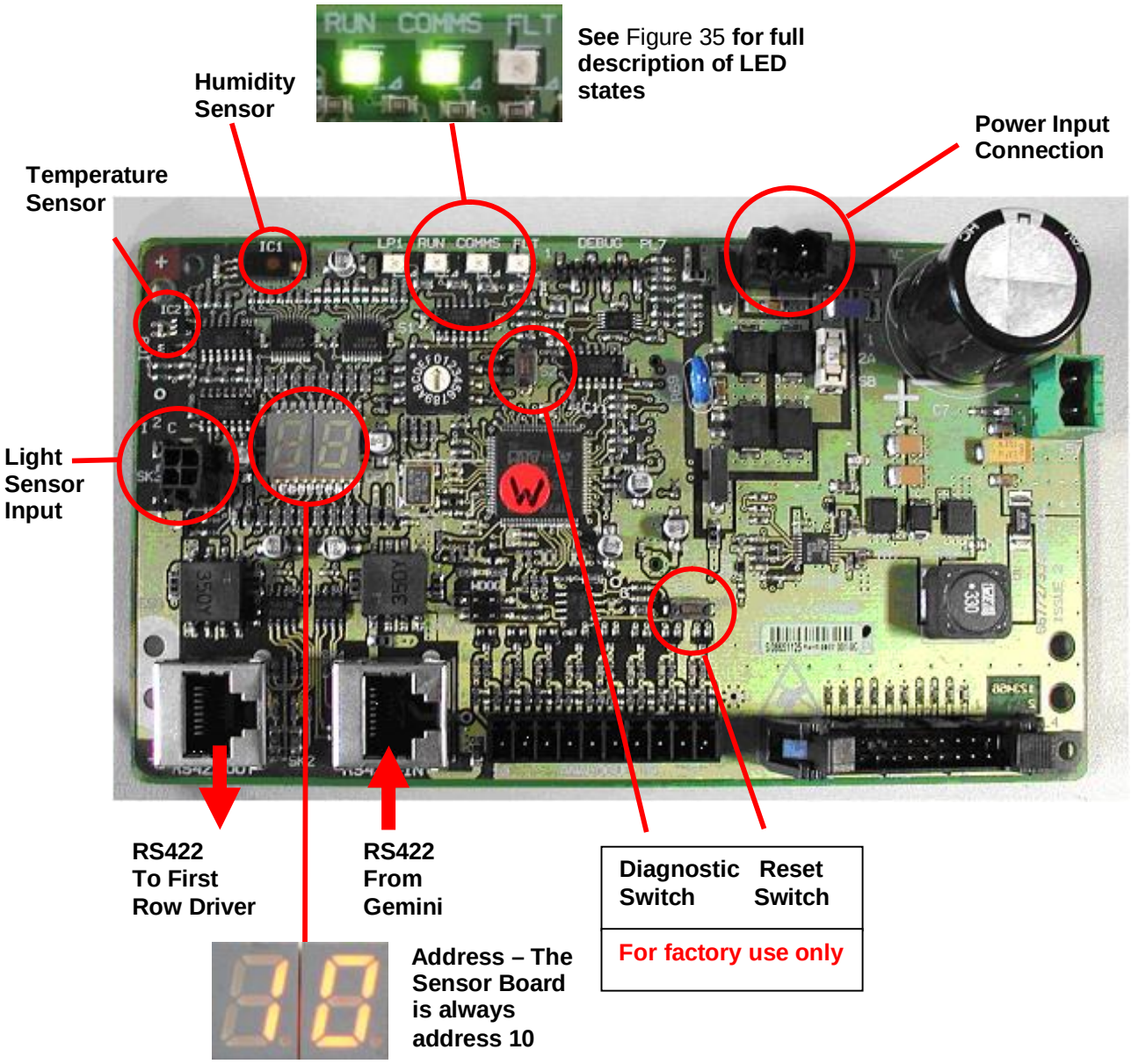


Figure 34 - The Sensor Module

LED	Type	Meaning	Possible Cause
Fault	On	Fault	Fault present. Fault is indicated until reported over GSPI.
	Flash	Invalid address	Invalid address
	Off	No fault	No fault or no power
Run	Flash	Normal operation	Normal operation
	Off	No power	No power or fault
Comms	Flash	Comms active	GSPI comms present
	Fast flash	Downloading	GSPI download in progress
	Off	No GSPI comms	GSPI comms lost

Figure 35 - Sensor Module LED States

The Gemini software periodically request sensor readings from the Sensor board. The sensor board then returns the values read from the external light sensor and on-board temperature and humidity sensors. To ensure that short duration transients in the light level are ignored the light sensor readings are averaged over a three minute period by the Gemini. The Gemini then sends information indicating the appropriate brightness level to the Row Drivers as part of a broadcast message. If the luminance is changed this occurs synchronously across all Row Driver boards.

5.2.2.9 The Display modules

The Elektra sign uses a variety of display module designs. These modules vary in pitch, size and colour. The display modules link together and are controlled by a row driver module which is usually fitted to the first display in the row. They perform LED open/short circuit monitoring, and are fitted to a sunshield assembly. The sunshield ensures the required contrast under direct sunlight conditions, and is mounted in the sign with M8 nut fixings. At the time of writing the following Display PCB assemblies are available:

	Description	Number of Characters	Part Number
1	100mm Character PCB Assembly (Yellow)	3	667/1/33951/001
2	100mm Character PCB Assembly (Red/Green)	3	667/1/33951/002
3	160mm Character PCB Assembly (Yellow Full Matrix)	3	667/1/33953/001
4	160mm Character PCB Assembly (Yellow 5x7 Matrix)	3	667/1/33957/001
5	160mm Character PCB Assembly (Red/Green Full Matrix)	3	667/1/33953/002
6	240mm Character PCB Assembly (Yellow)	1	667/1/33955/001
7	320mm (Yellow) = 2 x 160mm Yellow (table row 3)	1.5	667/1/33953/001
8	200mm Graphical Arrow = 2 x 100mm Yellow (table row 1)	Arrow	667/1/33951/001
9	320mm Graphical Arrow = 2 x 160mm Yellow (table row 3)	Arrow	667/1/33953/001

The PCB assemblies included in the table do not include PSUs or Sunshields. Kits are available, but from a maintenance perspective it is envisaged that individual PCB assemblies only will be replaced on site.

5.2.2.10 100mm Character PCB Assembly (Yellow) – 667/1/33951/001

Figure 36 shows the front of a 100mm Yellow display module, illustrating that only alternate LED columns are populated.

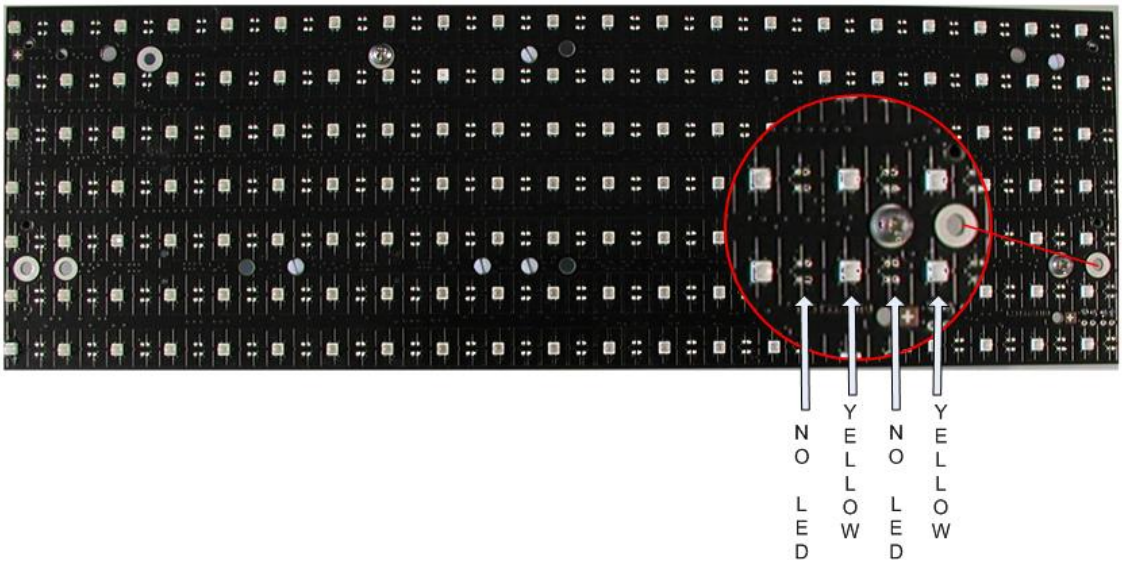


Figure 36 - 100mm Character PCB Assembly (Yellow) - Viewed from front

Figure 37 shows the rear of a 100mm yellow display module, showing the connectors for the V_{LED} PSU and the Row Driver module. The Row Driver is only fitted if this is the first display in a row, and it can be seen that the second V_{LED} PSU connector is omitted as this only has yellow LEDs.

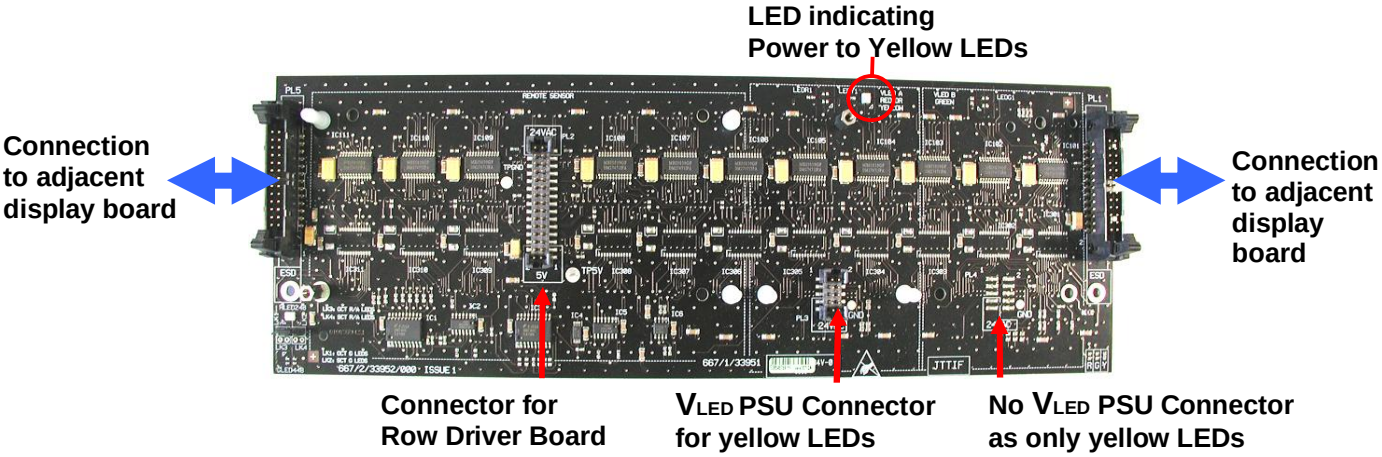


Figure 37 - 100mm Character PCB Assembly (Yellow) – Viewed from rear

The VLED indicates the presence of power for the display LEDs.

Figure 38 shows a 100mm Yellow display module with a VLED PSU fitted and fitted to a sunshield

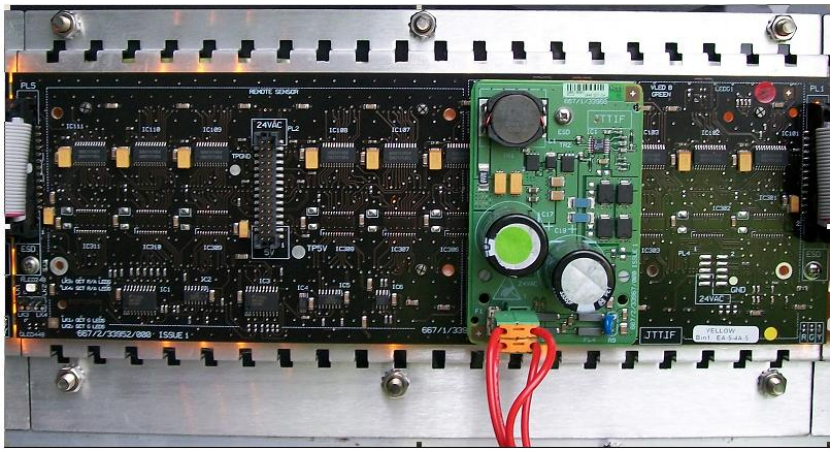


Figure 38 - 100mm Character PCB Assembly (Yellow) with VLED PSU fitted

5.2.2.11 100mm Character PCB Assembly (Red/Green) - 667/1/33951/002

Figure 39 shows a 100mm Red and Green display module and illustrates that the LED columns are fitted with LEDs of alternate colour, with all positions being populated.

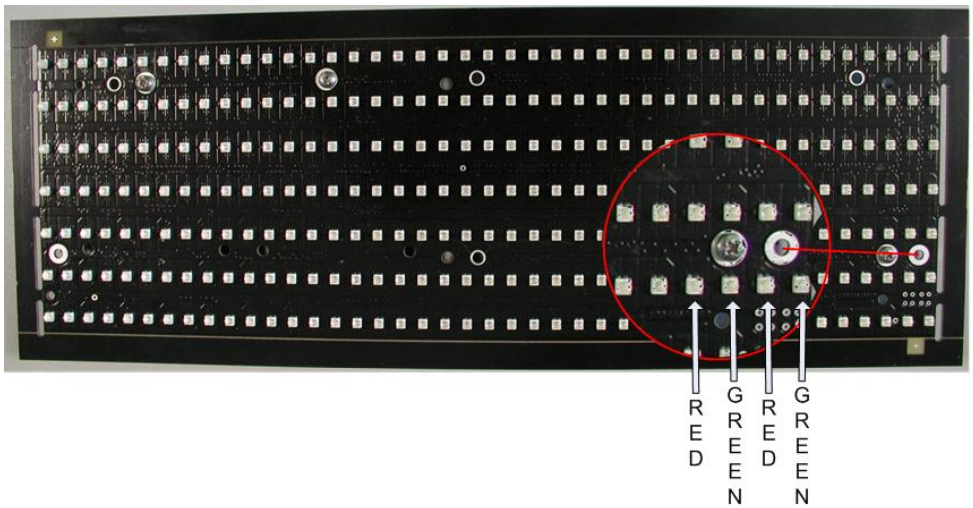


Figure 39 - 100mm Character PCB Assembly (Red/Green) - Viewed from Front

Figure 40 shows the rear of a Red and Green Display module, demonstrating that connectors are provided for two **VLED** PSUs and that two VLED indicators are provided to show the presence of power to both colours of LEDs.

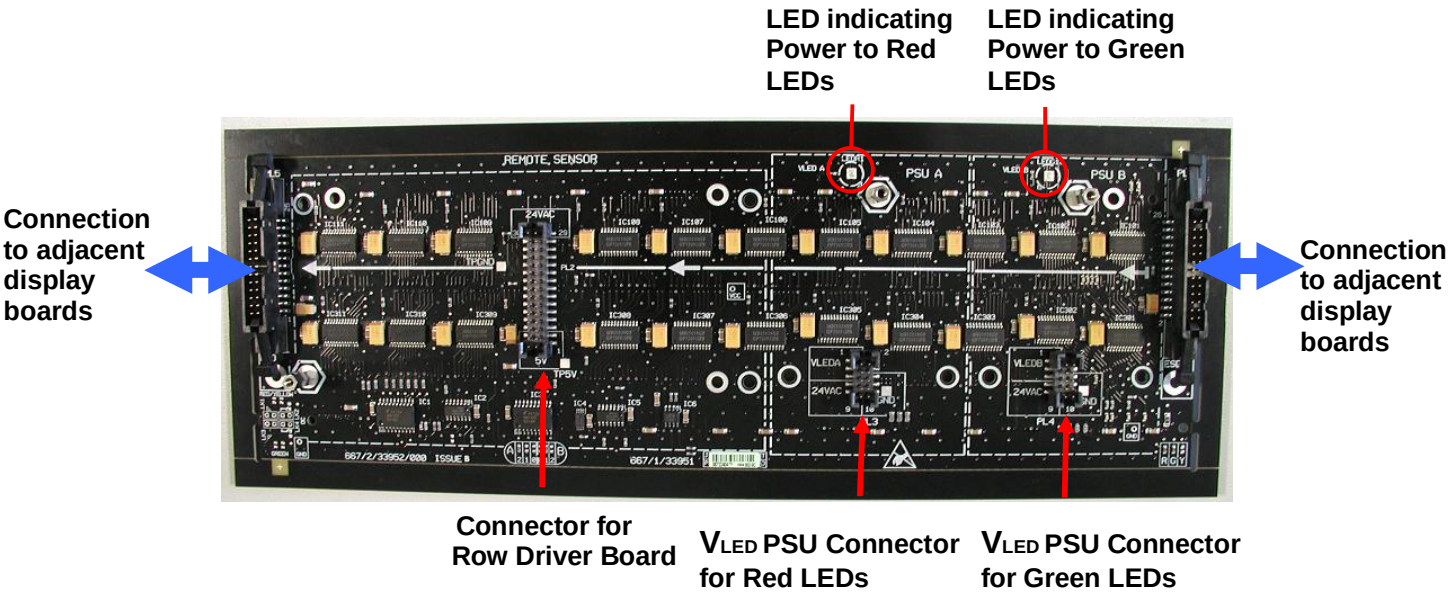


Figure 40 - 100mm Character PCB Assembly (Red/Green) – Viewed from Rear

Figure 41 shows a 100mm Red and Green display module with two VLED PSUs and a Row driver fitted, and fitted on a sunshield.

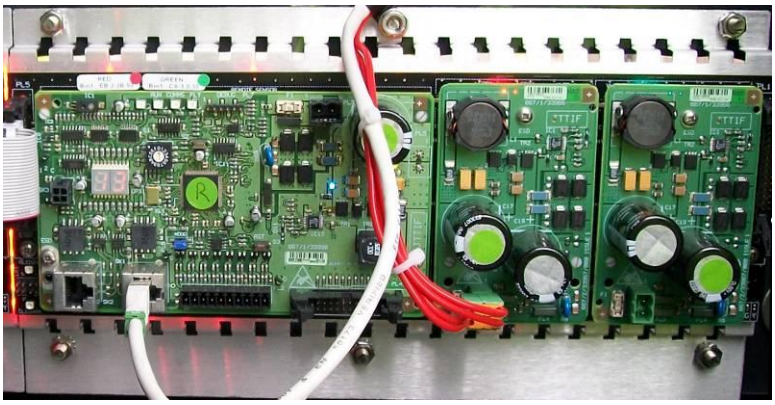


Figure 41 - 100mm Character PCB Assembly (Red/Green) with VLED PSUs and Row Driver fitted.

5.2.2.12 160mm Character PCB Assembly (Yellow Full Matrix) – 667/1/33953/001

Figure 42 shows a 160mm yellow Display Module. As with the 100mm module only one VLED PSU is module is required.

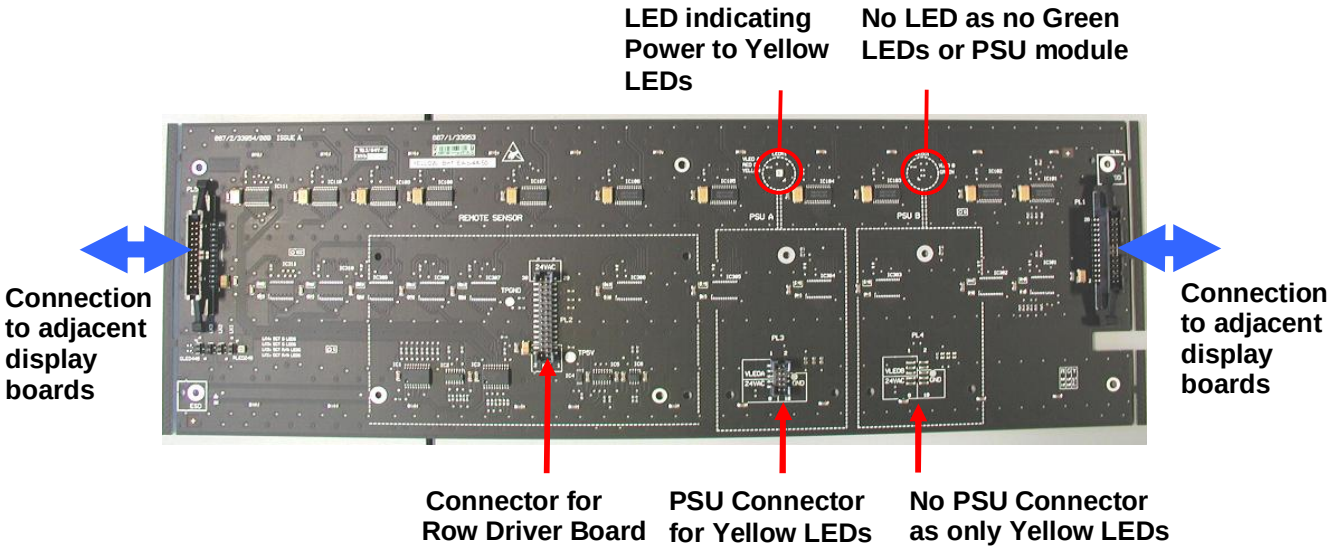


Figure 42 - 160mm Character PCB Assembly (Yellow Full Matrix) – Viewed from Rear

5.2.2.13 160mm Character PCB Assembly(Red/Green) Full Matrix - 667/1/33953/002

Figure 43 shows the rear of a 160mm Red and Green display module, which is fitted with two VLED PSUs and the Row Driver module. As a row driver is fitted, the board pictured is the first in the row and will have no other boards connected to the right (as viewed from the rear). Other boards in the same row will not have row drivers fitted.

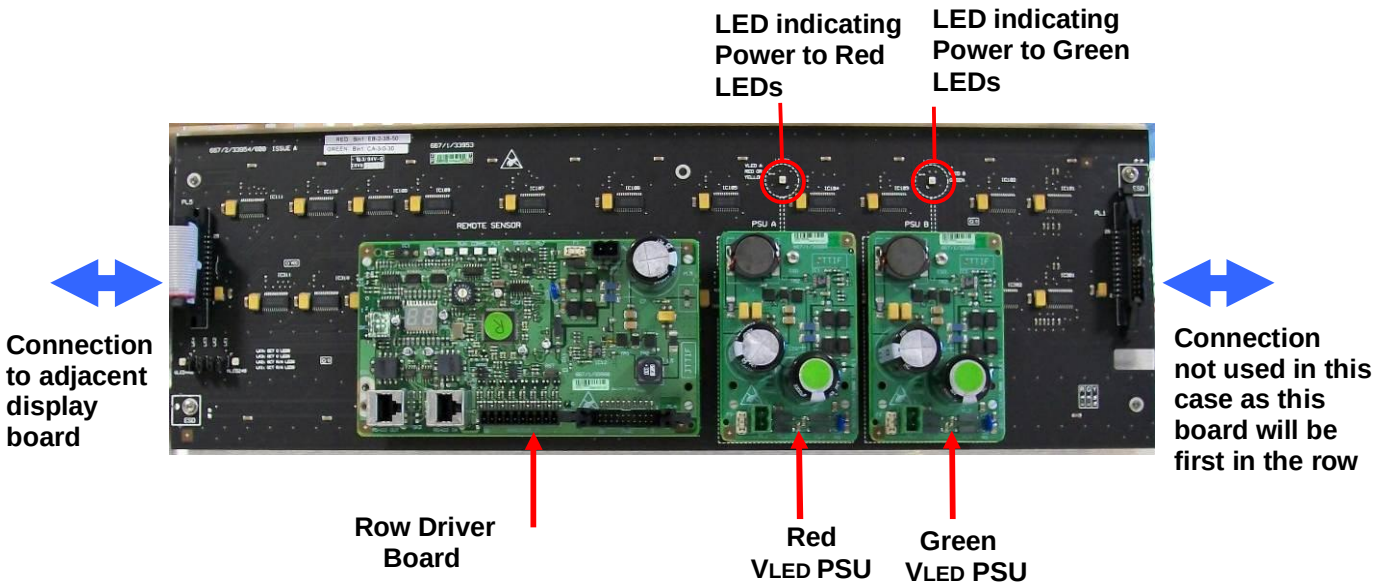
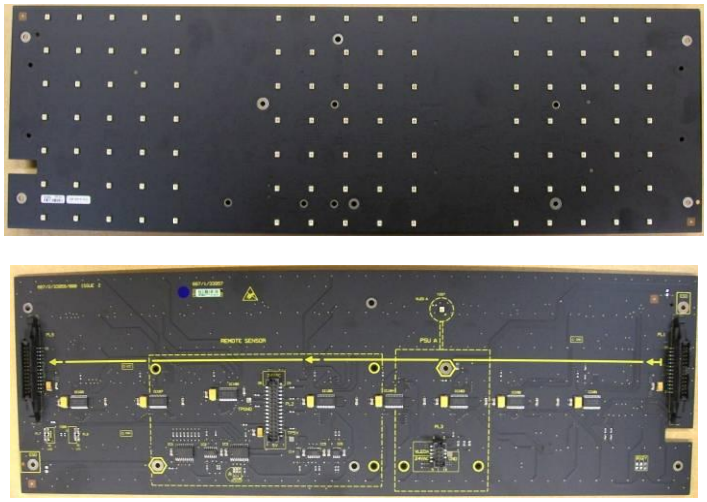


Figure 43 - 160mm Character PCB Assembly (Red/Green) Full Matrix – Viewed from Rear

5.2.2.14 160mm Character PCB Assembly (Yellow) 5 x 7 Matrix - 667/1/33957/001

Figure 44 shows the front and rear of a 160mm 5 x 7 display module, which is populated with LEDs to form 3 distinct character rather than a full matrix. This configuration is only available on 160mm yellow displays. The lower picture shows the connectors for the VLED PSU and the Row Driver module in a similar arrangement to the full matrix 160mm display boards. The Row Driver is only fitted if this is the

first display in a row, and it can be seen that only one V_{LED} PSU position is provided as the board can only have yellow LEDs.



Front

Rear

Figure 44 – 160mm Character PCB Assembly (Yellow) 5 x 7 Matrix

5.2.2.15 Colour selection on Red and Green Display modules

In normal use, text will be displayed in one of the two colours i.e. Red or Green. This is controlled within the software driving the displays.

By default, all text will be displayed in Green.

Reddening of special words is enabled and disabled using the Web Browser *Special Words Compare Facility* option on the StatusConfig->UVMS Library->General configuration page.

The special words themselves are defined on the StatusConfig->UVMS Library->Special Words configuration page. If no words are configured then no words will be red. For more details please see the commissioning section (Section 11).

5.2.2.16 240mm Character PCB Assembly (Yellow) – 667/1/33955/001

Figure 45 shows a 240mm yellow Display Module with a Row Driver and a V_{LED} PSU module fitted. One V_{LED} PSU module is required for every two boards. The power ribbon cable should only be fitted between boards that share a V_{LED} PSU -

- The first board on each row has a V_{LED} PSU fitted and power is transferred to the second board (which has no V_{LED} PSU) by a ribbon cable.
- The second board does not have a power connection to the third, which has its own V_{LED} PSU. The third board has a power connection to the forth (which has no V_{LED} PSU).

This sequence repeats and is illustrated more clearly in Figure 80.

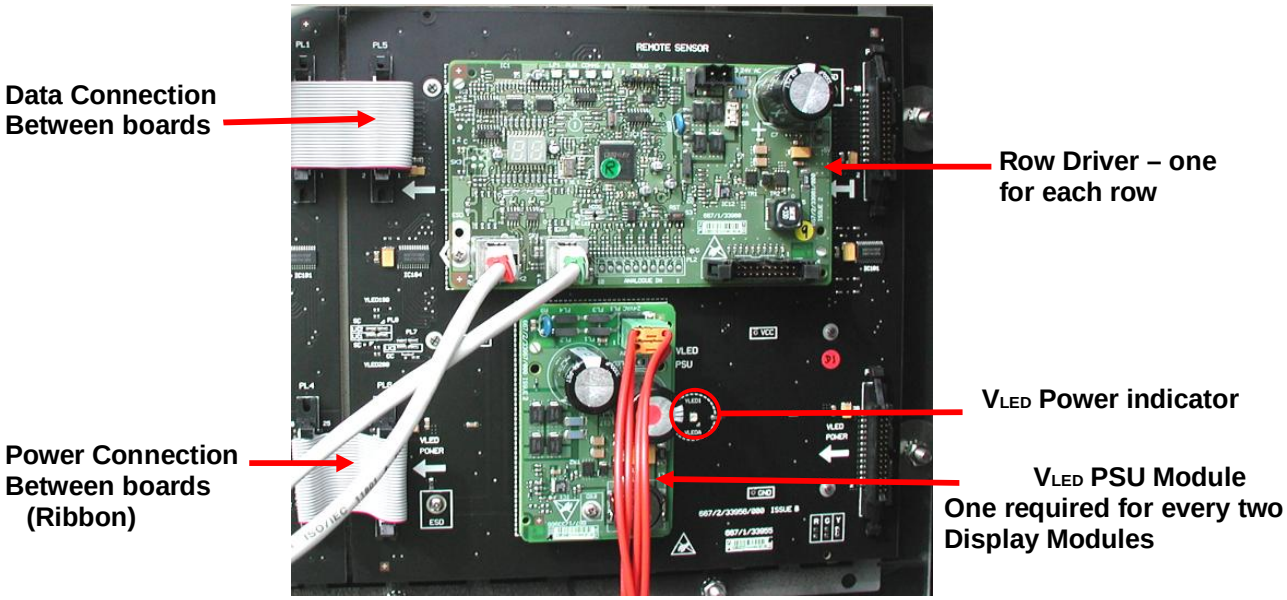


Figure 45 - 240mm Character PCB Assembly (Yellow) – Viewed from Rear

5.2.2.17 320mm Display (Yellow) – 2 x 667/1/33953/001

320mm displays are constructed by 'tiling' two rows of 160mm boards to form a continuous 320mm high LED matrix.

Each pair of 160mm boards (vertically stacked) provides 1.5 character width of 320mm text.

This means, for example, that 2 pairs of 160mm boards will provide 3 characters of text or for an 18-character 320mm row, 2 'rows' of 12 160mm boards are required.

Note that each 'row' of 160mm boards used to construct a 320mm row requires its own row driver.

5.2.2.18 Graphical Arrows

In a similar manner to 320mm displays, it is also possible to 'tile' either 2 x 100mm or 2 x 160mm full matrix display boards to form what is termed as a 'graphical arrow'

This is an arrow which may point in any one of eight directions (N, NE, E, SE, S, SW, E, NE as per points of the compass), under control of the instation, in conjunction with text messages set on the sign to provide a context sensitive display.

Graphical arrows are only available on Car Park Guidance Signs and only in Yellow.

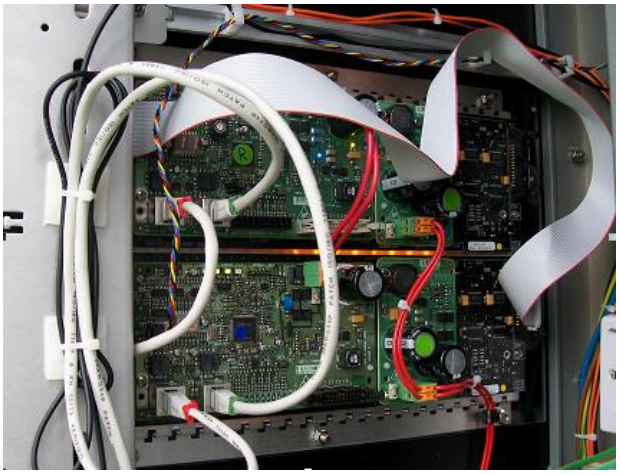


Figure 46 - Graphical arrow comprised of 2 x 100mm Character PCB Assemblies

These codes can be defined using the web page described in section 13.11.6.

A Graphical Arrow is treated as a self contained single row and uses only one Row Driver, with a ribbon cable connecting the two 100mm or 160mm display boards as shown in Figure 47.
Figure 47 shows diagrammatically how the Modules are connected to give a Graphical Arrow.

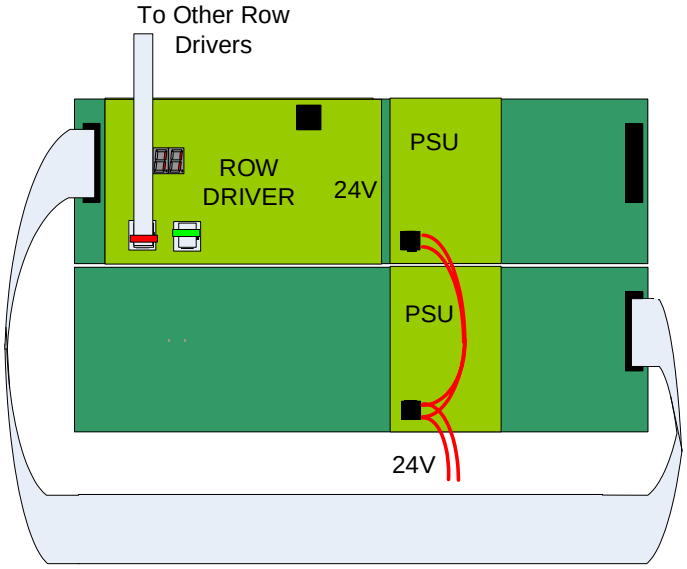


Figure 47 - Graphical Arrow Arrangement - Viewed from Rear

5.2.2.19 The VLED PSU – 667/1/33966/001

The VLED Display Power Supply board is designed to provide the high-current low-voltage power to the LEDs of each Display module.

One Display Power Supply board is fitted to the rear of each monochrome 100/160mm Display module and one PSU for every two 240mm single-display module.

Two Display Power Supply boards are fitted to the rear of each dual-colour Display module.

There is only one Display Power Supply board variant – the voltage that the PSU generates is selected automatically when the board is plugged into the Display board – no commissioning is required. This has two benefits:

- No installation error is possible
- Only one spare needs to be carried by field services

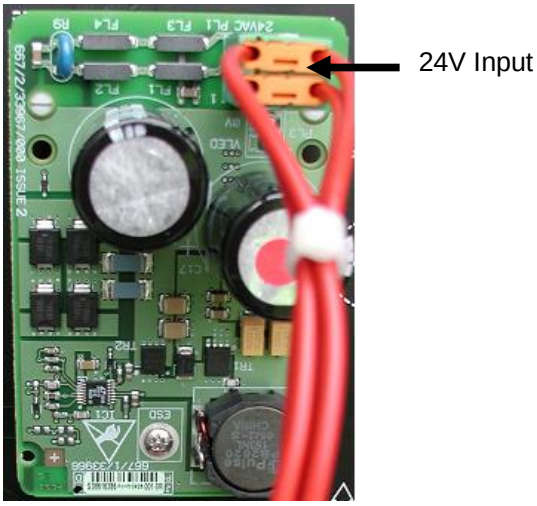


Figure 48 – VLED Power Supply Board

This board supplies the following voltages depending upon the application:

- For 100mm and 160mm yellow or red displays this board supplies 3.52V.
- For 240mm yellow displays it supplies 6.3V.
- For lantern modules it supplies 6.3V,
- For 100mm and 160mm green displays this board supplies 5.36V.

5.2.2.20 Lantern Display Assembly – 667/1/44610/800

The Elektra sign has the option to be manufactured with yellow LED lanterns in each corner. The purpose of this is to indicate that the message is of a safety based or warning nature. Only the first of the four lanterns has a row driver module fitted to it and this connects to the other display row drivers using a CAT5 cable. The lanterns themselves are linked together with their own dedicated bus. This uses CAT6 cable. Please see the lantern cabling arrangement diagram.

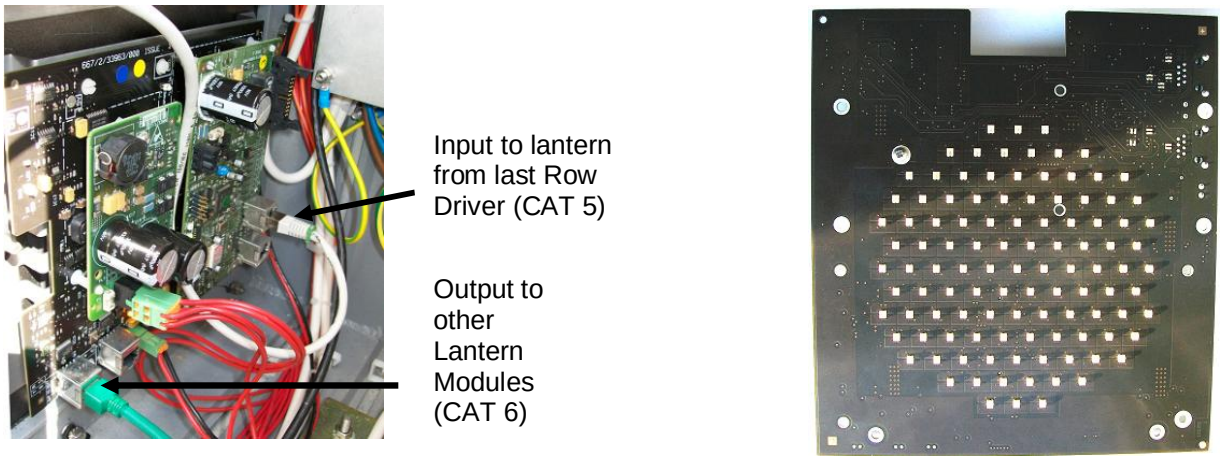


Figure 49 - Lantern Module (first)

Figure 50 illustrates the main features of a lantern board.

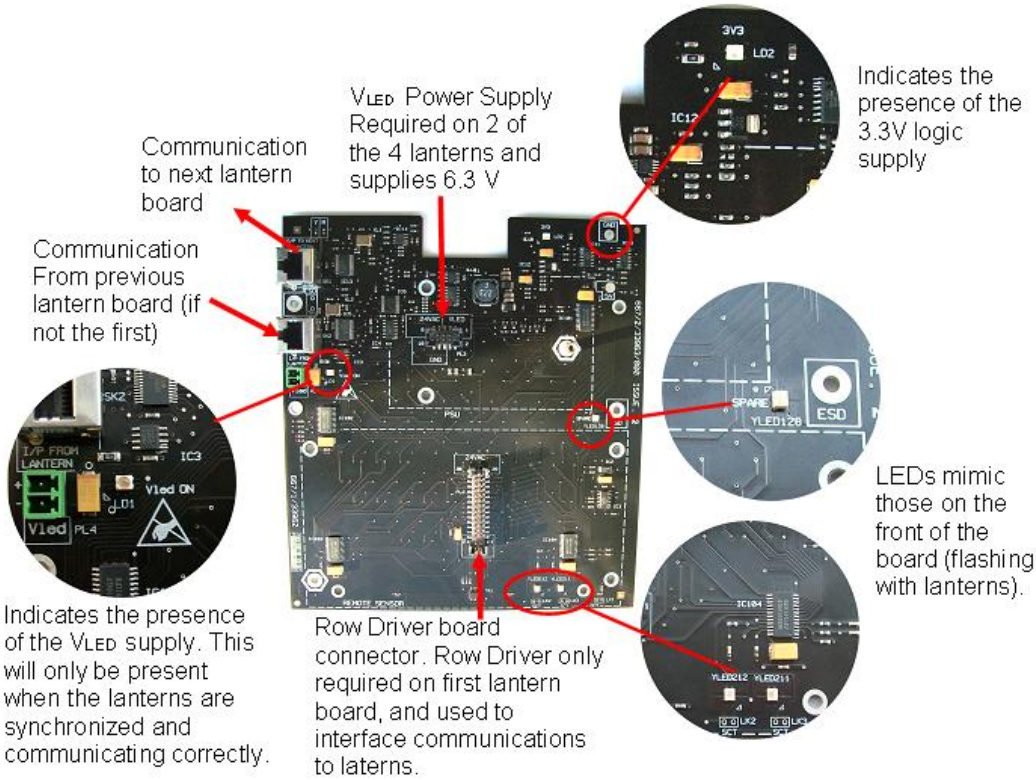


Figure 50 - Lantern PCB

5.2.2.21 Lantern Cabling arrangement

Figure 51 shows how the lanterns should be connected. CAT5 cables are used to connect the last display row driver to the lantern row driver, and then the lantern boards themselves are connected using CAT6 cables. All RJ45 connectors are labelled ‘IN’ and ‘OUT’ and the cabling must take account of this.

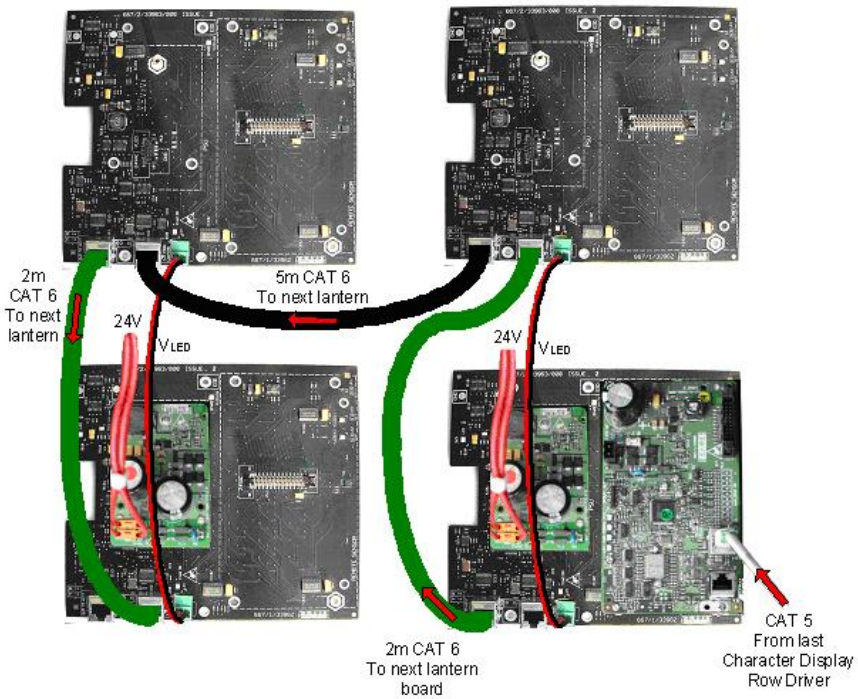


Figure 51 - Lantern Cabling arrangement

Figure 52 provides a diagrammatic representation of this.

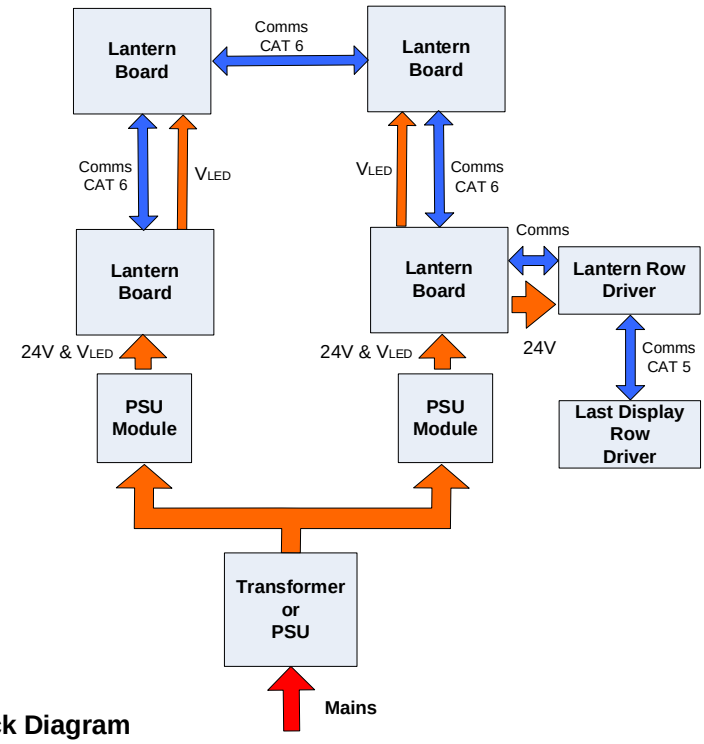


Figure 52 - Lantern Block Diagram

IMPORTANT

It is essential that only CAT 6 cables are used for inter-connecting the Lantern boards where specified. If CAT 5 cables are used then intermittent and unreliable operation will result.

5.2.2.22 Display Blanking

A Power Enable (POWER_EN) signal is generated by the Row Driver boards and is routed to the PSU boards via the display boards. In the event of a communications failure between the Row Drivers and the Gemini or Display Boards, the Row Drivers force POWER_EN inactive, which turns off all the LED PSU's in that Row and extinguishes the power LEDs on associated the display boards. This situation is recognised by the Gemini (either through loss of communication with the row-driver or through a fault reported by the row-driver) which then blanks the whole sign. Thus it is normal under these circumstances to first see a row extinguished followed by the rest of the sign (the time between these events depends on the cause of the fault and the values of timeouts configured in the Gemini).

5.2.2.23 The Heater

Heater Elements (wires) run along the bottom of all the display rows. These are controlled by the Gemini in response to Temperature and Humidity information collected from the Sensor Board.

Connections from PL5 on the Gemini processor board are used to energise a Relay to switch power to the primary winding of a 24V transformer. The secondary of this transformer supplies the heater elements. The Relay assembly includes an LED which illuminates when the relay is energised. Depending on the size of the sign, and therefore the number of Heater Elements fitted, the transformer will be either 150 VA or 500VA (see parts list).

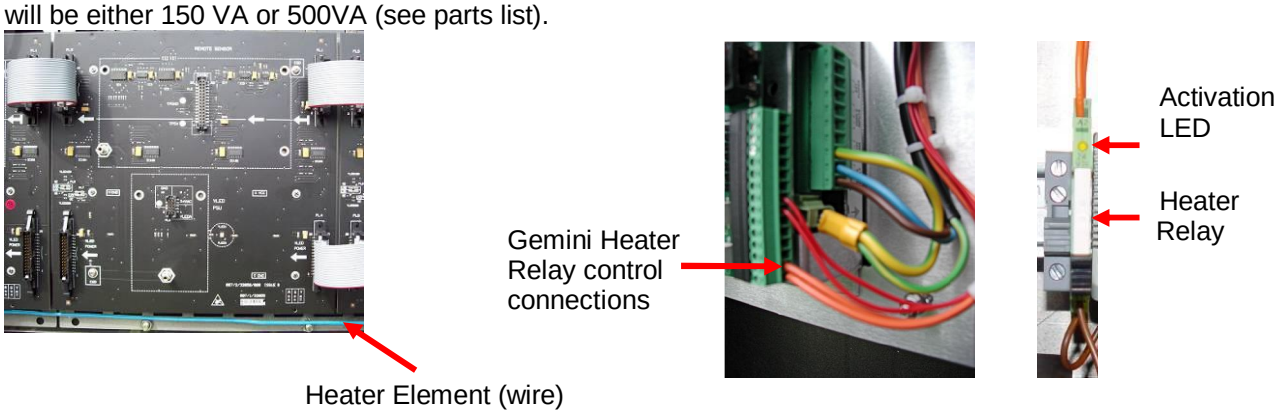


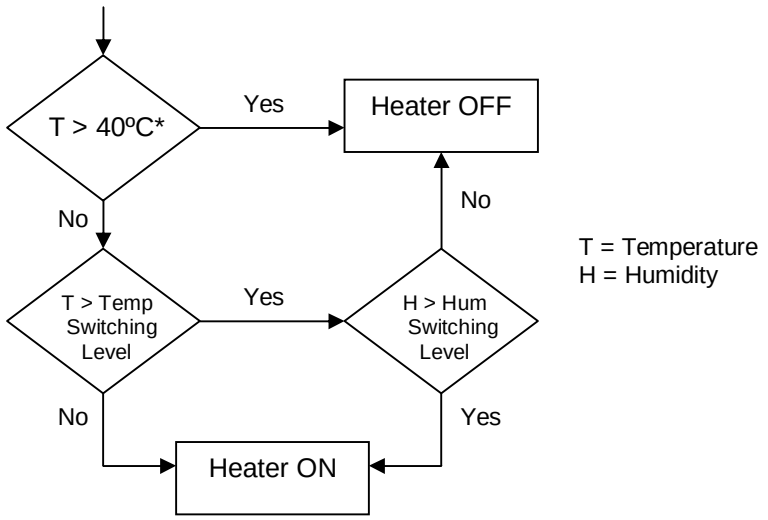
Figure 53 – Heater arrangement

Figure 54 gives the connections used for the Heater Control and the Door Switch.

Pin	Processor PL5	Function	Cable Colour
1	N/O output 1	24V Switched O/P to Heater Relay Coil	Orange
2	Common 1	24V I/P from Transformer	Orange
3	N/C output 1		
4	N/O output 2		
5	Common 2		
6	N/C output 2		
7	Input common return	Door switch Connection	Red
8	Buffered input 1	Door switch Connection	Red
9	Buffered input 2		
10	Buffered input 3		
11	Buffered input 4		
12	Buffered input 5		
13	Buffered input 6		
14	Buffered input 7		
15	Buffered input 8		

Figure 54 – Gemini I/O connections

The Gemini is responsible for controlling the heater. The simplified flow chart shown in Figure 55 illustrates the decision making process used. For simplicity it does not show hysteresis.



* The Cut out temperature is shown as 40°C, but is configurable.

Figure 55 – Heater flow chart (Simplified)

Figure 56 and Figure 57 show that there is Hysteresis between the levels at which the heater is turned on and off. This is true for both temperature and humidity. This prevents the heater from turning on and off in quick succession.

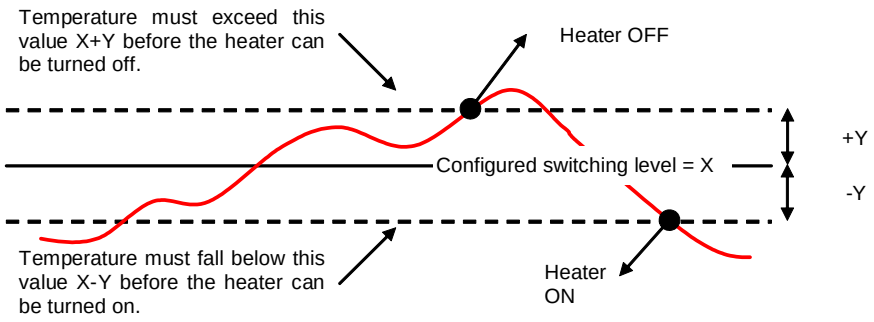


Figure 56 – Temperature thresholds

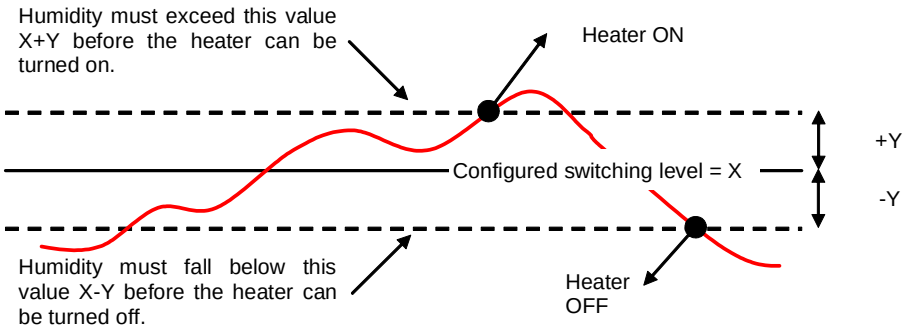


Figure 57 – Humidity thresholds

5.2.2.24 Door Switches

Each cabinet door has a door switch. These switches are wired in series, and when the doors are all closed this shorts together two Gemini input contacts. When any of the doors are opened the contacts become open circuit and the Gemini indicates to the instation that a door is open.

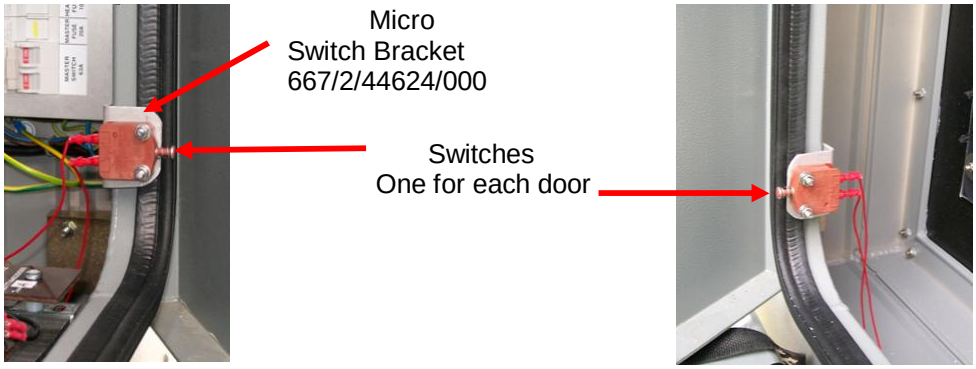


Figure 58 – Door Switch Locations

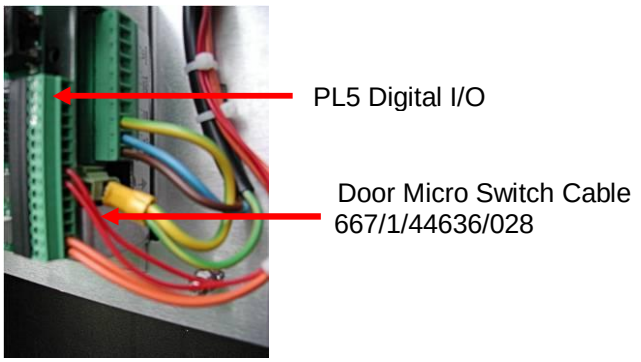


Figure 59 – Door Switch Connections to Gemini

Figure 60 and Figure 61 detail the connections used for the door switch.

Pin	Processor PL5	Function	Cable Colour
7	Input common return	Door switch Connection	Red
8	Buffered input 1	Door switch Connection	Red

Figure 60 – Door Switch Connection details

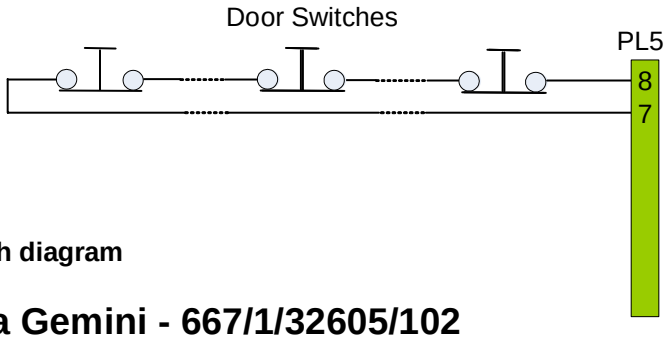


Figure 61 - Door Switch diagram

5.2.3 The Elektra Gemini - 667/1/32605/102

5.2.3.1 Functionality

The Gemini performs the following major functions:

- Provides a remote monitoring and control interface to the instation via a suitable modem connected to either the RS232 Modem interface or the 10/100 Ethernet interface.
- Provides an RS232 interface to the RS232/RS422 converter (Comms Board), allowing pixel data to be sent to the Displays (via the Sensor Modules and Row Driver Modules), and fault data to be received from the Display, Row Driver, and Sensor Modules.
- Provides an I/O interface to connect input devices such as the door switches and output devices such as the heater control relay.
- Provides a local monitoring and control interface to the on-site Engineer via an RS232 handset Port by either direct serial connection or via a bluetooth connection.
- Provides the power supply for the modem.

- Provides a battery-backed means of powering the modem and Gemini during power outage to allow 'last gasp' power status to be communicated to the instation.

Figure 62 shows an ELEKTRA Gemini 2 with the RS232/RS422 board fitted.

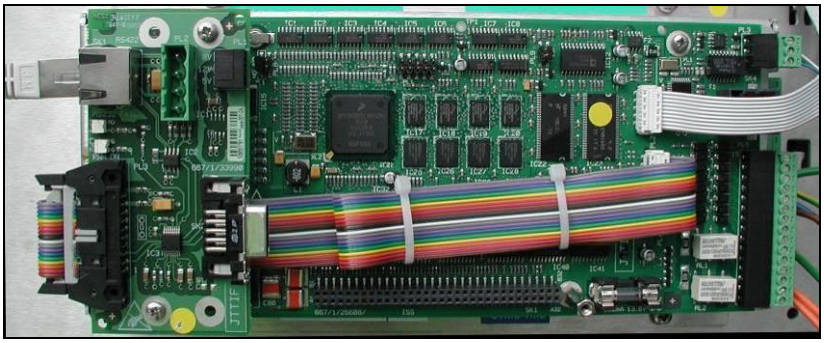
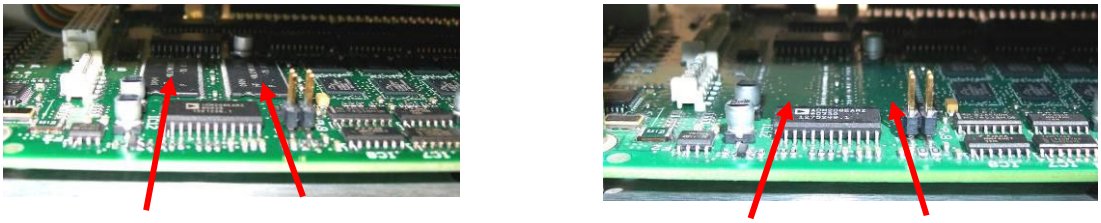


Figure 62 - ELEKTRA Gemini 2 with the RS232/RS422 board fitted

Figure 63 shows that an ELEKTRA compatible Gemini can easily be identified by the additional memory situated on the processor board.



ELEKTRA Gemini 2 with additional memory (total 16Mb)

Gemini 2 without additional memory (total 4Mb), cannot be used as part of ELEKTRA.

Figure 63 – Identifying the correct Gemini Unit

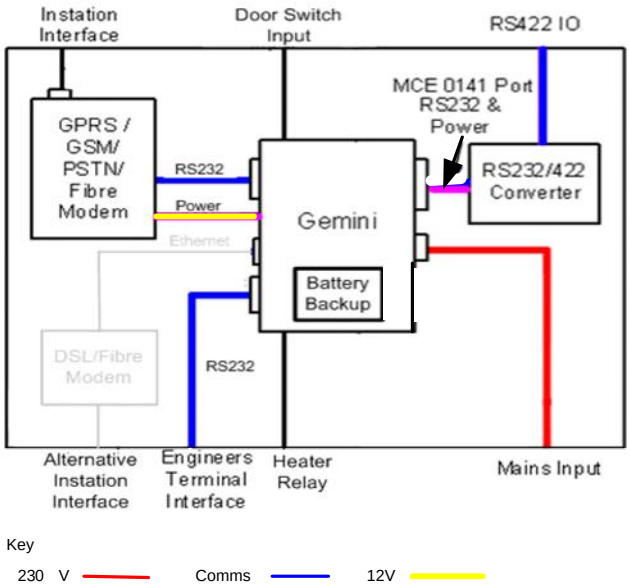


Figure 64 – Gemini Interfaces

5.2.3.2 Gemini Mains Supply

The Gemini is supplied from a 5A fuse located in the Master Switch Assembly. The mains connects to the Gemini on pins 1,2 and 3 of the PSU connector.

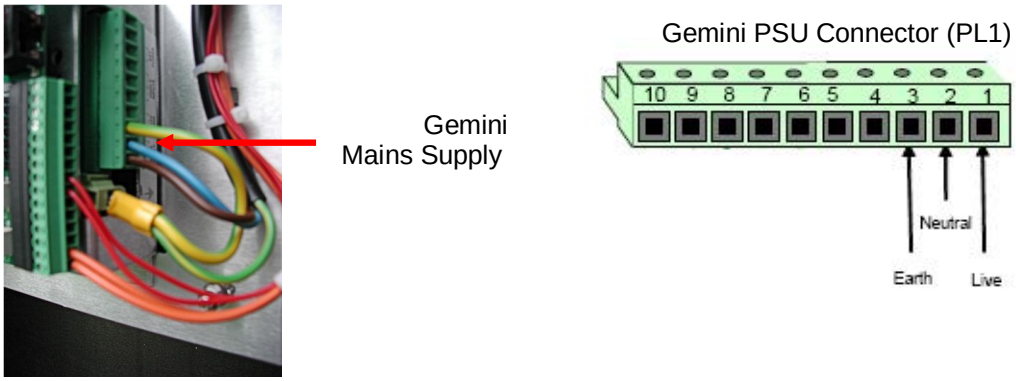


Figure 65 – Gemini Mains Connections

IMPORTANT Ensure that the Earth lead is securely connected to the Earth Terminal Block and PL1.

5.2.3.3 Support Batteries

The Gemini is fitted with a rechargeable battery which supports the entire unit including the modem, for a minimum of four minutes under all conditions in order that the Outstation may inform the Instation of a mains power failure. This battery must not be operated in the inverted position (i.e. with the terminals pointing downwards). A Lithium coin cell battery is provided on the CPU and supports the RAM memory and the Real Time Clock during power failures for in excess of 7 months. The processor board also has a 'Gold Cap' capacitor fitted that allows the RAM battery to be changed without loss of RAM data. The Gold Cap device provides a minimum of 30 minutes support. The two batteries have the following specifications:

Battery	Type	Support
Unit Battery	12V Lead Acid 418/4/42314/010	Minimum 4 minutes (20 minutes typical)
RAM Battery	Lithium 418/4/53433/000	In excess of 7 months after the main support battery has expired.

Figure 66 – Gemini Battery Details

5.2.3.4 The Processor Card

The main features of the Processor card are:

- Battery backup of the entire RAM.
- An Expansion Bus for fast card-to-card data transfers. The Processor card can address up to three IO cards.
- Three programmable RS232 Serial communications Ports:
- Handset RS232 Port.
- Auxiliary RS232 Port.
- Modem RS232 Port.
- A battery backed Real Time Clock.
- Flash memory for program storage and Journaling File system.

- ‘Zero-Cross Over’ signal derived from the associated PSU support PCB.
- Power Fail monitoring (low voltage inhibit)
- A Watchdog monitor
- Processor error indication
- Voltage Regulation (allowing a range of DC input)
- Power for the modem, with a choice of two voltages
- Status LEDs
- Power dissipation less than 100 mW

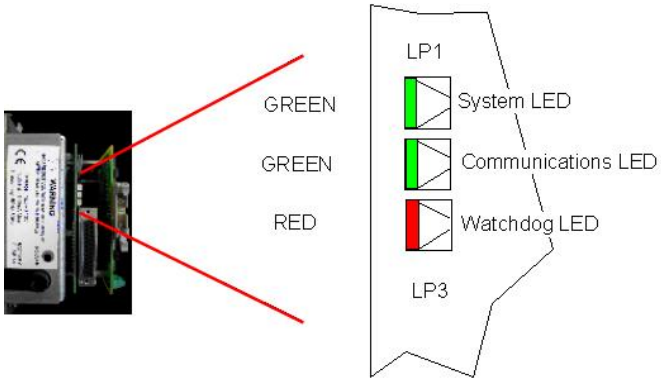


Figure 67 – Gemini LED Indicators

The three LED indicators on the Processor card give the following status or fault indication:

LED Name	State	Indication
System LED (GREEN)	OFF	No power or Processor error
	Slow Flash (on for 1 sec, off for 2 sec)	Normal operation
	Fast Flash (on for 1/4 sec, off for 1/2 sec)	A fault has been detected – check the Fault Table screen on the web interface.
	Heart Beat (two flashes in 1 second, then off for 1 second)	Main software not executing. Running bootloader and waiting local software update.
	Fading up and down in brightness	Main software not executing. Running ‘launcher’ program and waiting local software update.
	ON Steady	Processor error
Communications LED (GREEN)	OFF	No data being received from the network
	Brief flashes	Communications traffic
	ON with brief flashes OFF	Communication established and under control of the instation
Watchdog LED (RED)	OFF	The Processor is running and keeping the watchdog triggered.
	ON	The hardware watchdog has timed out sometime in the past. When illuminated, this does not mean that the unit is currently in a watchdog state. To clear: Hold down the Processor card Reset button for 2 seconds.

Figure 68 – Gemini LED interpretation

5.2.3.5 Isolated Outputs

The Elektra Gemini is equipped with relay isolated outputs (two change-over contacts). One of these outputs (N/O output 1) is used to control the heater relay. The following table gives the electrical characteristics of the outputs:

	Processor card Output
On Output Impedance	182Ω ± 1%, 0.1 Watts
Off Output Impedance	100kΩ min.
Continuous Current Sink	50mA †
Breakdown Voltage	1500V
Isolated Voltage	1500V
Relay Type	Change-Over

Notes:
† The continuous current sink is limited by the resistors.

Figure 69 – Gemini Output Specifications

5.2.3.6 Digital Inputs

The Processor card supports 8 x TR2500 compliant digital inputs. One of these inputs (Buffered input 1) is used to monitor the state of the door switches.

These digital inputs have the following input electrical characteristics:

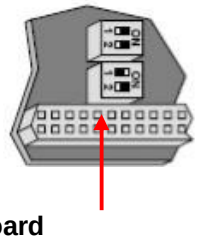
	Processor card Inputs
Input Impedance	4300Ω*
'Off' Threshold	> 50kΩ
'On' Threshold	< 600Ω
Recommended Max. Voltage	n/a
Absolute Max. Voltage	+1kV / -7V
Isolation Voltage	2500V RMS

* Referenced to 13.8V

Figure 70 – Gemini Input Specifications

5.2.3.7 Additional IO Board for Parallel UTC Interface

When Elektra is to be controlled using the parallel IO (UTC) interface, it is necessary to add an additional IO board (WEZ I/O part number 667/1/31124) to the Gemini. The IO signals controlling the sign are connected as shown in Figure 71. Figure 71 shows a WEZ I/O board fitted to the Gemini 2. The correct address switch settings are illustrated, and the Input pins are identified (only the first 4 pins are illustrated, however the remaining pins follow the same arrangement identifies the pins to which the 8 bit word can be input.



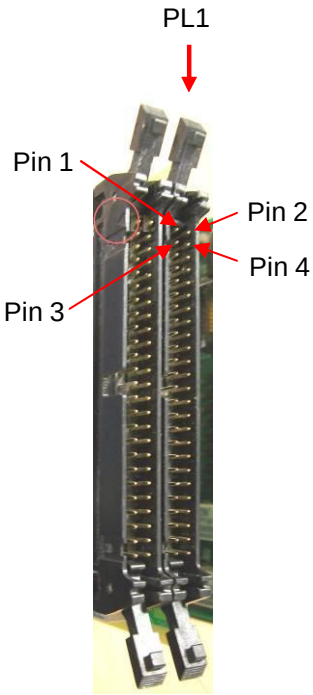


Figure 71 - WEZ I/O Board

Pin	PL1
1	Buffered Input 1
2	Buffered Input 2
3	Buffered Input 3
4	Buffered Input 4
5	Buffered Input 5
6	Buffered Input 6
7	Buffered Input 7
8	Buffered Input 8
25	Input Common Ret
26	Input Common Ret

Figure 72 - Digital input pins

5.2.3.8 The RS232/RS422 Converter

This small PCB is supplied as part of the Elektra Gemini and takes +5V directly from Gemini serial port. The current required is approximately 50mA.

The functions and features of this module are as follows:

- Converts from RS232 to RS422 at the same baud rate. (Maximum Baud rate 1M Baud)
- Power input on 20-pin IDC connector
- Optional power input on separate 3-pin connector.
- Optional linear voltage regulator, allowing operation from voltages higher than 5V DC
- RS422 output and power available on RJ45 connector
- Optional screw-terminal connection for RS422

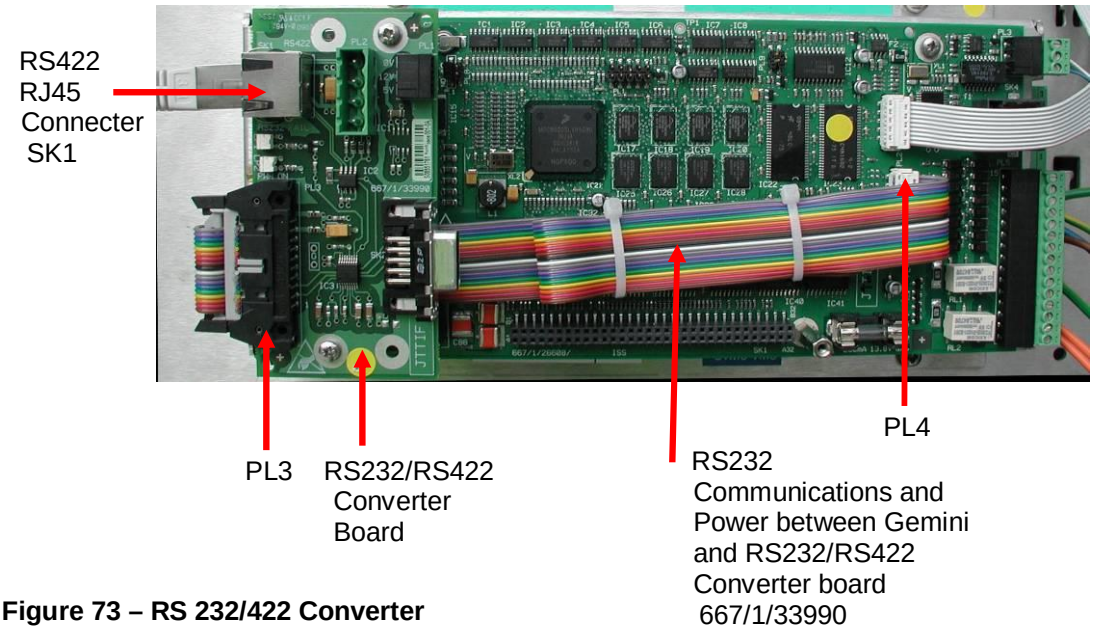
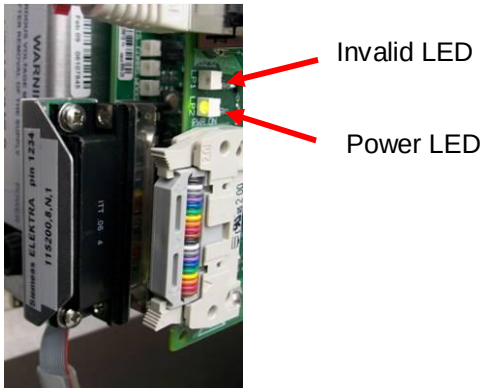


Figure 73 – RS 232/422 Converter

The RS232/422 converter has 2 front-panel LEDs with the following Status/Fault indications:

Invalid LED (Red)

Off – no power or running OK.
On steady – invalid RS232 levels on input (Gemini turned off or RS232 cable unplugged or faulty)



Power LED (Green)

Off – no power
On steady – power present (+5V)

Figure 74 – RS 232/422 Comms Module LEDs

5.2.4 Direct/Local Connection and Security

The Signs will be assembled in the factory to support one of two local handset connection options as follows:

- Direct RS232 serial link
- Bluetooth link

Both links are serviced via the RS232 serial port on the front of the Gemini CPU card.

5.2.4.1 The RS232 Communications Link

It is possible to access two types of interface over the RS232 communications link: the WIZ text based configuration interface and the web interface. To access the WIZ interface a connection should be made at one of the following baud rates: 57600, 19200, 9600, 1200 (all 7 bits, even parity). To access the web interface the GeminiConnect Tool should be used. Full details on using both the WIZ interface and the GeminiConnect Tool are given in the GVP Reference Manual (667/HB/31760/000). The WIZ interface allows access to only a subset of Elektra's capabilities. The web interface should be used to access the full configuration, monitoring and maintenance capabilities.

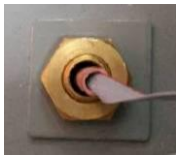
The recommended USB to Serial Cable is the Lindy 42812. If communication problems are experienced with this cable when using the GeminiConnect tool, try running GeminiConnect setup again. This will set the correct baud rate which may have changed from the required value (115299).

5.2.4.2 Bluetooth Communication Link

The Bluetooth link is routed from the Gemini handset port to a Bluetooth Module located on the outside of the rear of the sign enclosure (on the right hand side when viewed from the rear).
The handset facility supports a Web page and a Telnet interface and is accessed via a Bluetooth enabled laptop. The Gemini Connect Tool is used, and a username and password are required to establish the connection.

Bluetooth connection to the handset port.

Bluetooth antenna on the rear of the sign enclosure.



View of the Bluetooth Module from inside the sign, showing cable routing and securing nut.

Figure 75 – Bluetooth Link

5.2.4.3 Instation Remote Connection

The sign is assembled to support one of two remote connection options as follows:

- RS232 serial link (to GPRS modem or GPRS router).
- Ethernet connector (to DSL / fibre modem)

Figure 76 – Ports for Instation Communication

Both links are available towards the rear of the Gemini processor card.

5.2.4.4 Remote Access to Web Pages

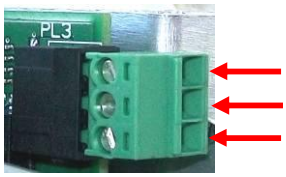
To be able access the sign web pages from a remote location the connecting network must transfer Port 80 from the sign to the computer running the web browser. This is the case in most installations where sign is controlled using the UTMC protocol but is not the case in most installations where the sign is controlled using the UVMS protocol. Note that these are generalisations and in both cases it is possible for the network to be configured such that the web pages are or are not accessible remotely.

If remote access to web pages is required then care should be taken to ensure that Port 80 is transferred across the connecting network. If this network is public at any point then care should be taken to ensure that the communications remain private.

The implication of not having a remote management interface is that all Gemini configuration would need to be carried out on site.

5.2.4.5 The Modem Power Supply

The Processor card (PL3) normally provides the modem power. Two voltage supplies are available on this card 5V (400mA) and 12V (1000 mA).
Insertion of the modem power lead into the relevant connector socket in the Modem Power connector PL3 selects which supply is used as follows:



Cableform Position	Voltage Supply	Modem Type
PL3 Socket 3	5V Supply	Dynalink PKS-5600-A-P/M
PL3 Socket 2	12V Supply	GPRS/GSM TC35
PL3 Socket 1	0V Supply	

Connections for the MC35 Modem

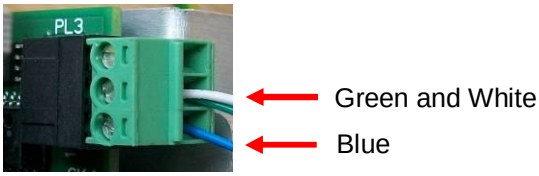


Figure 77 - Modem Power Supply Connections C

IMPORTANT ***Before connecting the plug into the modem with the unit powered up, check with a multi-meter that the correct power supply selection has been made.***

5.2.4.6 The MC35 GPRS Modem

This is the GPRS modem currently being used. Other types of modem may be used in the future.

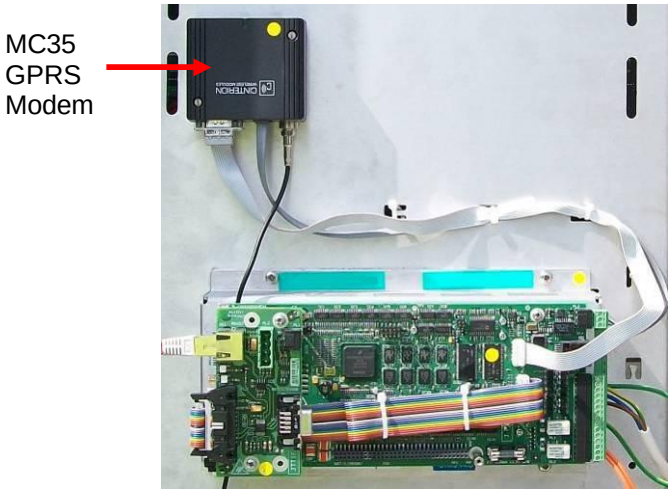


Figure 78 – MC35 GPRS Modem

The Siemens MC35 Terminal unit is a GSM modem capable of GPRS transmission. The MC35 supports GPRS transmission up to 21.4Kbps per time slot. Interfaces to the unit include an RS232 data port, power and an FME (male) aerial connector. An integrated SIM card reader is included. A diagnostic LED shows the current state of the unit.

The MC35 Diagnostic LED is used to indicate the following states.

Operating State	LED
Immediately after power up	On for 2 seconds
Network Search or no SIM card inserted or no PIN entered or no GPRS network available	Flashes approx 2 seconds on 2 seconds off
Found GSM network - ready to connect	Flashes once every 4 seconds
Found GPRS network - ready to connect	Double Flash every 4 seconds
Data Transfer	Flashes on for 1 second when data is transferred (this usually replaces the single flash every 4 seconds).

Figure 79 – MC35 GPRS Modem LED Indications

If it is initially not possible to achieve communications on the GPRS network, the RJ12 power connector should be disconnected and then re-inserted.

6 ELEKTRA CONNECTIVITY

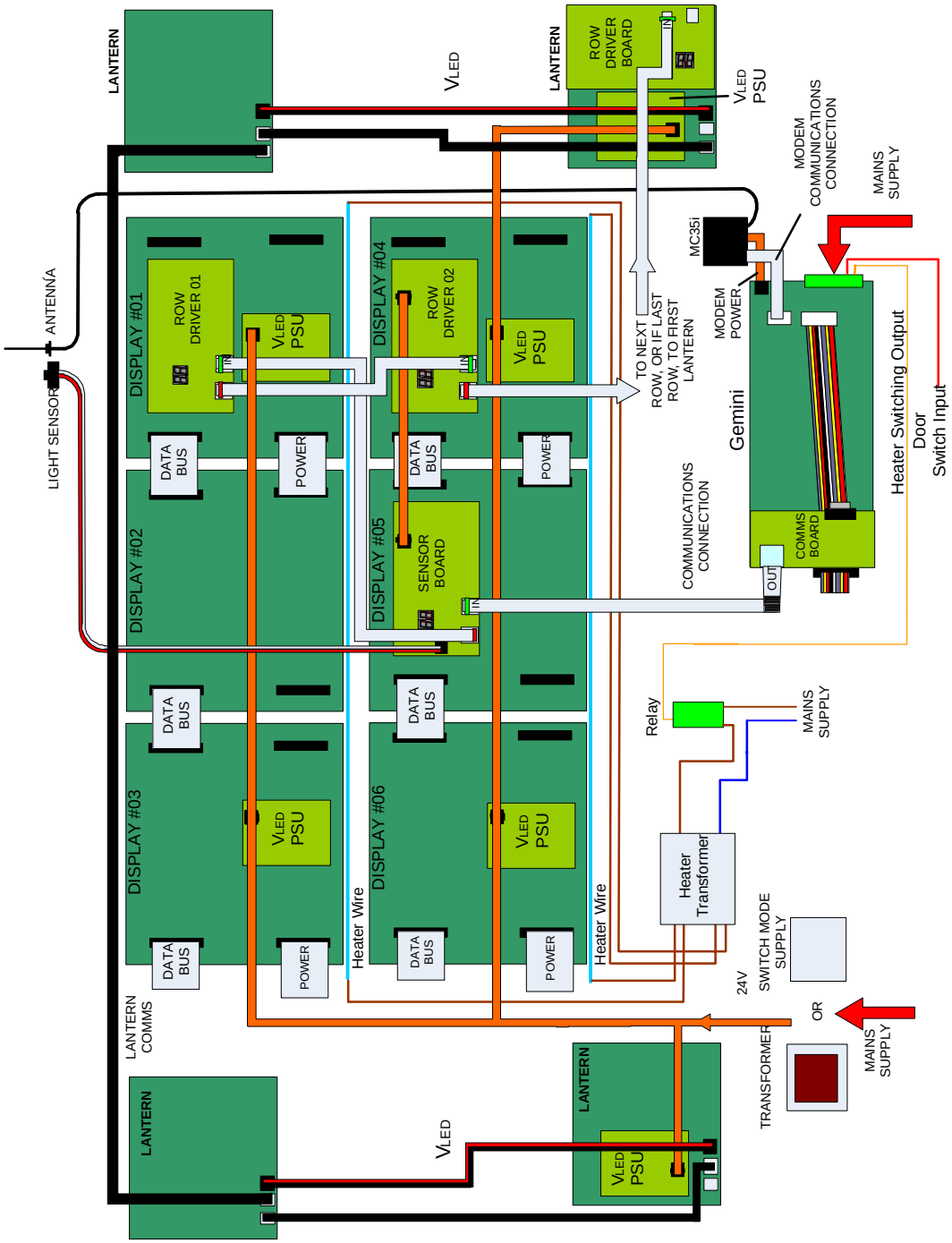


Figure 80 - Elektra internal connectivity – 240mm

This shows a diagrammatic representation of the connectivity within an Elektra LED messaging sign (240mm characters) when viewed from the rear. The diagram shows two rows of three display modules and 4 lanterns.
Note: The sensor board can be fitted to any display board as unlike the row driver board it does not have a direct connection to the display board.

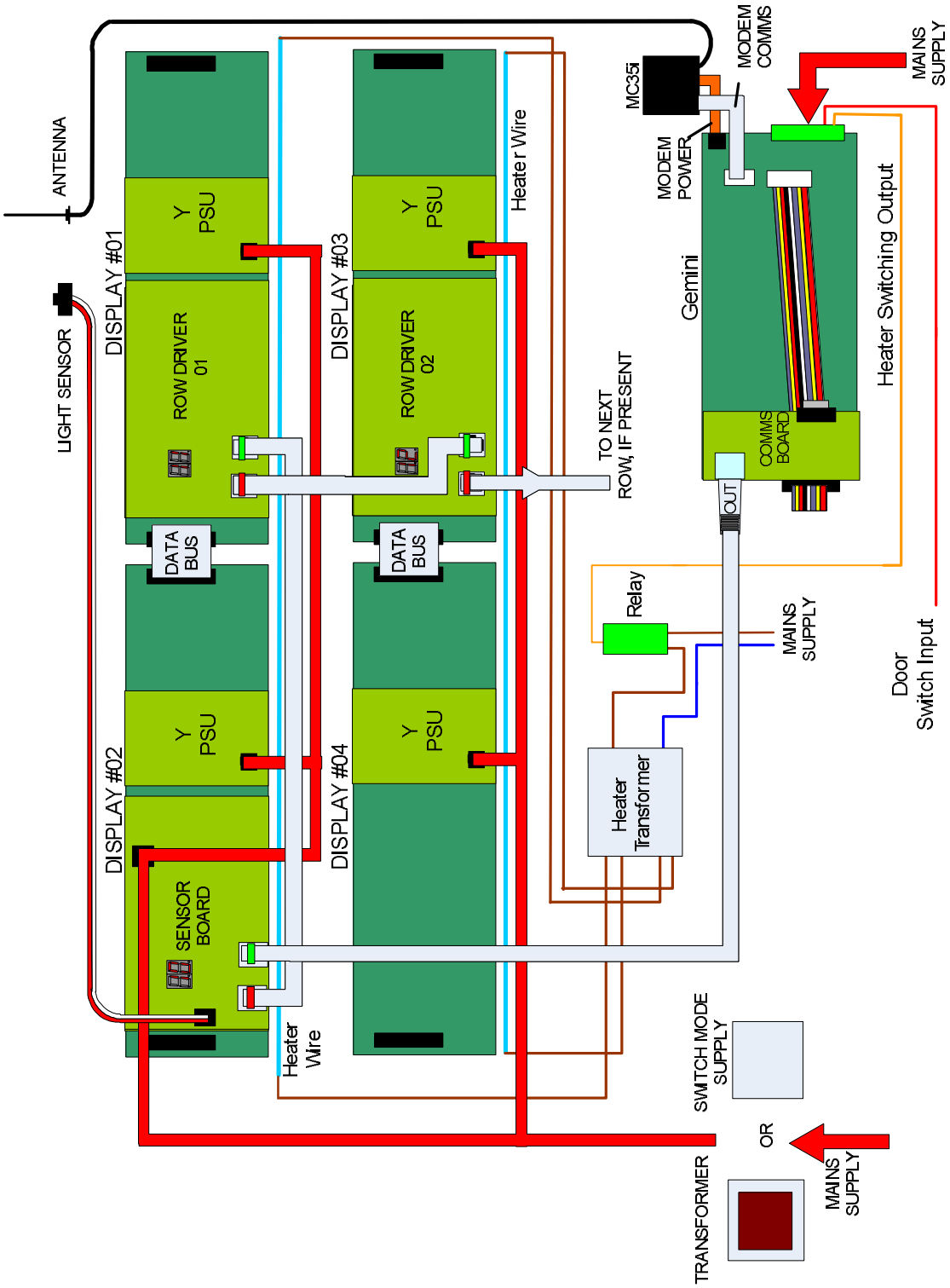


Figure 81 - Elektra internal connectivity – 100mm / 160mm Yellow

This shows a diagrammatic representation of the connectivity within an Elektra sign with yellow LEDs. It is viewed from the rear and shows 2 rows of 2 display modules.

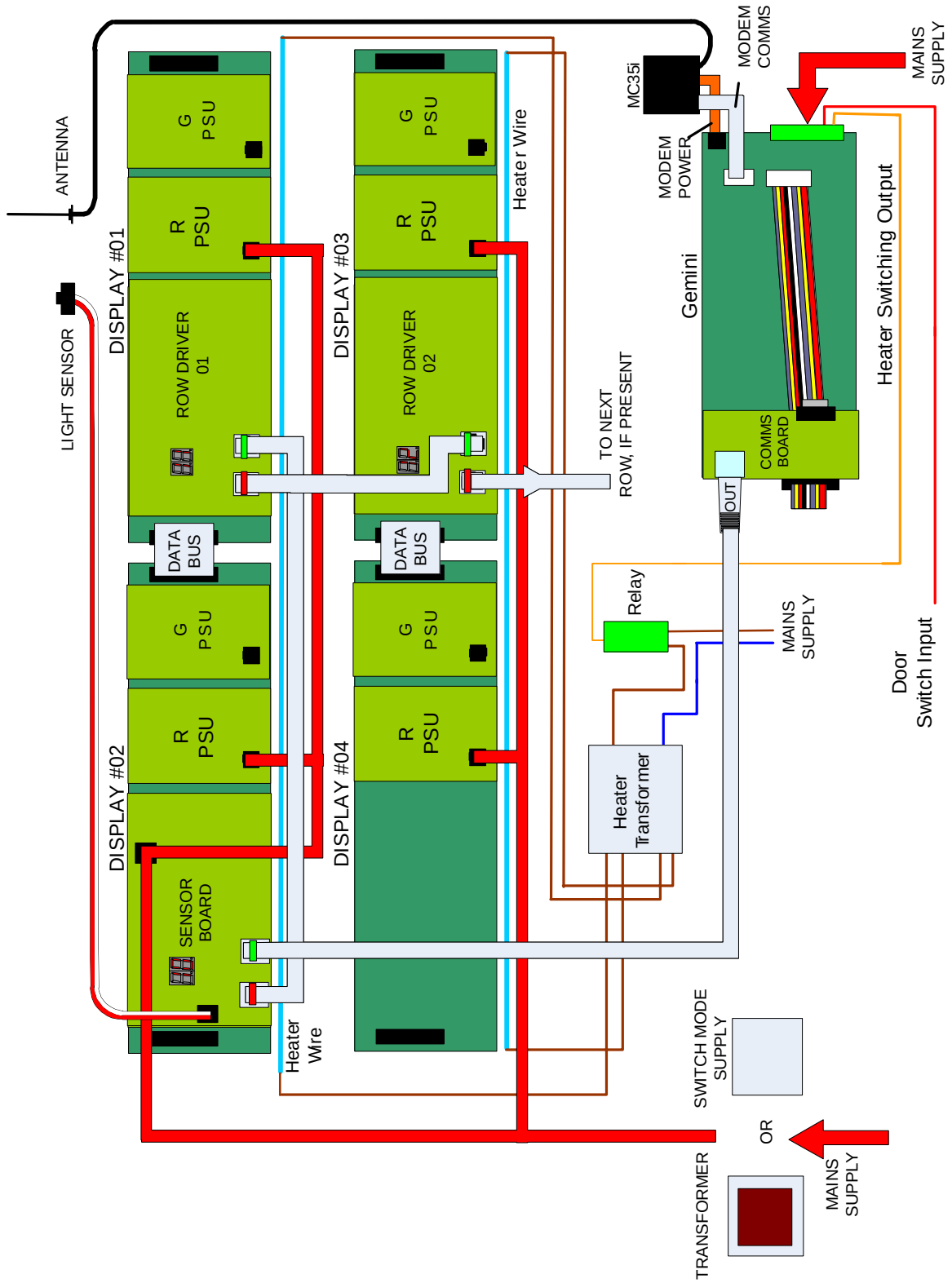


Figure 82 - Elektra internal connectivity 100mm / 160mm R&G

This shows a diagrammatic representation of the connectivity within an Elektra LED Car Park Sign with Green and Red LEDs. It is viewed from the rear and shows 2 rows of 2 display modules.

7 ELEKTRA SITE PRE-OPERATION PROCESS

The Elektra product has to go through several sequential stages before it can become operational. These sequences are summarised by the flow chart in Figure 83.

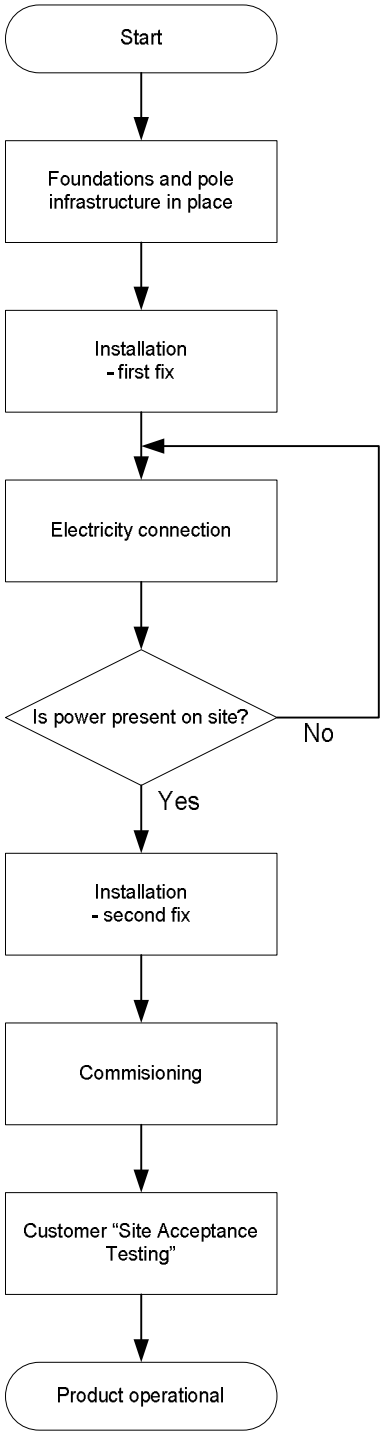


Figure 83 – Pre-operation chart

7.1 FOUNDATIONS AND POLE INFRASTRUCTURE

The foundations have to be poured and any ducting provided. The size of the foundations depends on the size and weight of the sign, geography (altitude, prevailing wind conditions) and the geology of the ground (sandy soil, clay require different foundations). The foundations will be designed in an early part of the project. Foundation designs are verified by qualified structural engineers and are performed individually for every sign location. This manual does not cover the construction of the foundations or assembly of the poles, although some generic detail is included in Section 8 of this document . Both of these processes are generally subcontracted as these are specialist activities outside the normal capabilities of the Siemens field service teams.

7.2 INSTALLATION – FIRST FIX

Installation can commence once the site infrastructure is in place. This includes foundations, sign support poles, ducting and electricity feeder pillars. The installation process doesn't require any power supplied on site. At the end of the installation the sign will have been erected, secured to the poles and any cabling from the sign ducted down the poles. No electrical connections will be made off during this phase. This activity is generally sub-contracted to the same organisation that erected the poles.

7.3 ELECTRICITY CONNECTION

This process is performed by the electricity utility supplier or their contractors and doesn't require Siemens field services to be present. This process culminates in a fused electricity cut-out being fitted to the electricity feeder pillar / bell pole.

7.4 INSTALLATION – SECOND FIX

The second fix of installation is normally performed by the Siemens field service group. A prerequisite of commissioning is that the electricity supply must be connected before this phase can be commenced. During this process basic electrical tests will be done to confirm the sign is safe to be connected to the electricity supply. The sign cabling is wired to the electricity feeder pillar and the sign is powered up. Energised tests such as polarity and earth loop impedance must then be performed. If the test results comply with the required values, the operative checks for basic operation and the sign is left powered so that the heaters are operational to prevent internal display fogging or condensation which might be damaging to the internal electronics.

7.5 COMMISSIONING

Commissioning consists of setting any configuration in the product that is specific to site. Instation configuration, communications testing and system testing are also performed as part of this activity. This activity is normally carried out by the Siemens Applications Engineering Group.

7.6 CUSTOMER SITE ACCEPTANCE TESTING

This is a witnessed functional test of the variable message sign to prove correct operation and specification. This is performed at the sign site and at the instation. The witness is the customer or the customer's representative. This testing usually follows a documented test plan written by or agreed by the customer. This activity is normally carried out by the Siemens Applications Engineering Group although they may delegate this responsibility to a suitably qualified Siemens Project manager on occasion.

8 INSTALLATION

The installation method will vary depending on which mounting option is chosen for the sign (Monopole (Cantilever), Simple Monopole (Stanchion) or Multipole).

8.1 GENERAL TORQUE SETTINGS

The level of torque to be used during installation to tighten the nuts is dependent on the nut size. The values required are as follows:

M30 – 1350 Nm
M24 – 660 Nm
M20 - 380 Nm
M16 - 190 Nm
M12 - 75 Nm

8.2 MONOPOLE SIGN

8.2.1 Installation of foundation and Anchor Frame

A foundation drawing will be supplied showing the required position and mounting of the Anchor Frame which provides the interface to the cantilever. This must be correctly positioned in the foundation and the concrete allowed to set fully, prior to installation of the cantilever and sign.

Note that any cabling for the sign (mains and/or signal) has to feed up the centre of the (hollow) cantilever. It is essential to run ducting from any feeder pillar and / or communications equipment into the foundation with draw rope(s) present during the foundation works.

When arriving at site to install the cantilever the mounting studs, with their associated nuts, should be visible securely located within the foundation.

8.2.2 Cantilever erection

The sign is delivered to site with the cantilever and sign enclosure as separate items.

Position the cantilever so it is lying on the ground with the base next to the foundation plinth. Thread a fish tape through the conduit hole in the top of the cantilever until it protrudes from the base. Tie the end of the draw rope coming out of the plinth cable duct to the end of the fish tape. Pull the fish tape through the cantilever with the draw rope on the end of it and knot off the draw rope.

Figure 84 – Threading the Draw Rope through the cantilever

Remove the template (top plate) and re-fit the nuts, levelling as appropriate with a small spirit level. Lift the cantilever and lower it onto the foundation plinth's bolts. Ensure that the draw rope is tight and doesn't get trapped during this operation.

Figure 85 - Erecting the Cantilever

Add the four nuts to secure the cantilever to the foundation. Check that the cantilever is vertical making minor adjustments to the upper and lower nuts as necessary.

Figure 86 - Checking the Cantilever is Vertical

Adjust the position of the cantilever by rotating it left to right so that the sign (when fitted) will point to the correct point on the road carriageway.

Tighten the nuts to the required torque (see section 8.1). Fit and tighten the lock nuts. Optionally bind the nut and bolt heads with tape to keep the threads clear of debris.

8.2.3 Fitting the sign to the cantilever

The sign will be delivered with two M16 eye-bolts fitted to the top surface for lifting.

Loosely attach the two (upper) swinging arm plates to the cantilever frame.

The lower pivot plates may have either holes or slots in them to mount the sign, for design reasons, and the process of hanging the sign is slightly different for each type.

If the lower pivot plates have slots in them, proceed as follows -

- Insert the two lower bolts and washers into the sign, and adjust them so that there is approximately 25mm free thread showing.
- Lift the sign using the eye bolts and position it next to the cantilever frame. Lower the sign carefully so that the already fitted bolts drop into the slots on the lower pivot plates.
- Ensure that the sign pivots with the bolts at the ***bottom*** of the slots and hand tighten the bolts.
- Add the bolts to the two swinging arm plates, reduce tension on the slings and adjust the vertical angle as required. Tighten all the bolts to the required torque (see Section 8.1).

If the lower pivot plates have holes in them, proceed as follows -

- Position the sign enclosure between the two lower pivot plates and insert the bolts and washers. Hand tighten the bolts.
- Add the bolts to the two swinging arm plates, reduce tension on the slings and adjust the vertical angle as required. Tighten all the bolts to the required torque (see Section 8.1).

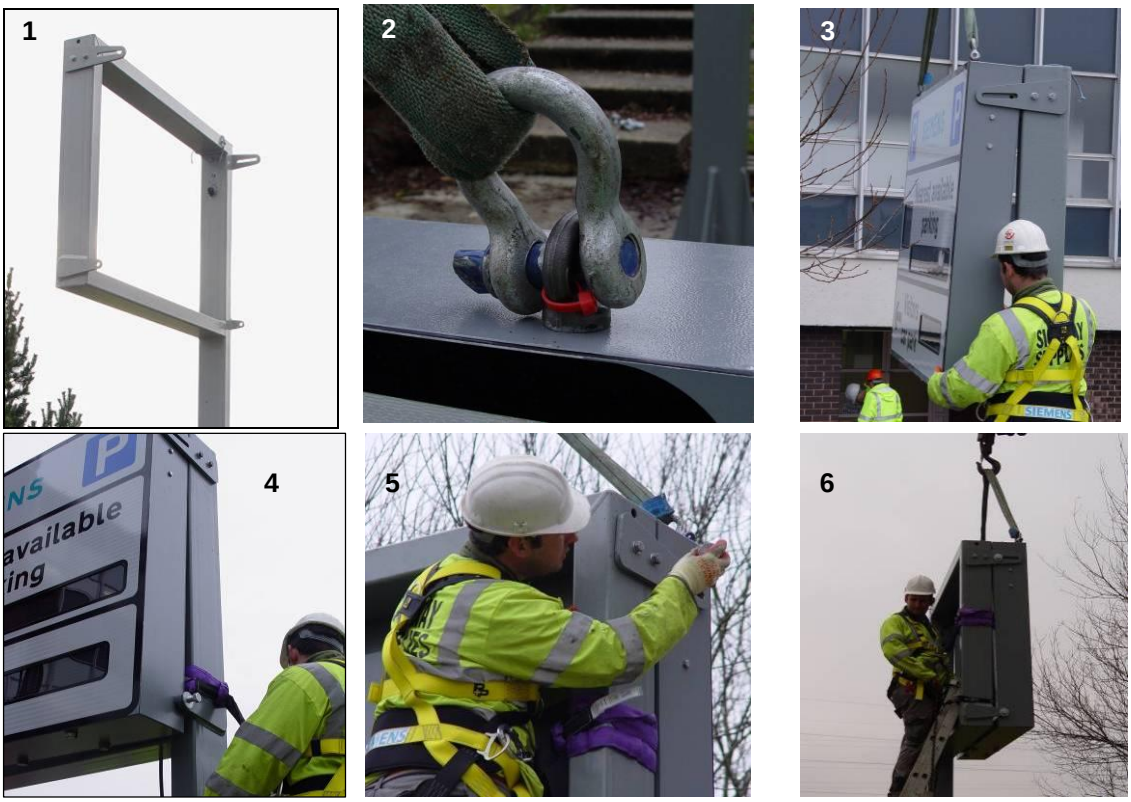
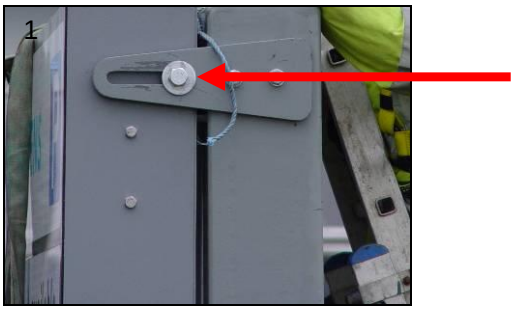


Figure 87 - Fitting the Sign Enclosure to the Cantilever

The sign will now be secured to the cantilever frame. Remove the lifting gear.

Remove the eye-bolts from the top of the sign and stow within the sign to allow them to be fitted if the sign needs to be lifted in future.

IMPORTANT	***On removing the eye bolts, be sure to replace them with the supplied bolts and fibre washers to prevent water from entering the sign.***
IMPORTANT	***Do not work underneath the sign at any time when it is supported from lifting eyes.***



Loosen bolts, adjust angle of sign then fully tighten bolts

Figure 88 - Cantilever Sign Elevation Adjustment

8.2.4 Connection of mains cable

See section 8.5.1

8.3 SIMPLE MONOPOLE

8.3.1 Installation of foundation and Anchor Frame

The Simple Monopole sign shares a common foundation mounting arrangement with the cantilever sign. Refer to Section 8.2.1 for full details.

8.3.2 Stanchion erection

The Simple Monopole sign has a much simpler mounting arrangement than the cantilever sign. The pole bolts directly to the base of the sign enclosure. The pole is installed onto the foundations in the same way as the cantilever (Section 8.2.2). From this point on the process is different.

8.3.3 Fitting the sign to the stanchion

The sign will be delivered with two M16 eye-bolts fitted to the top surface for lifting. Lift the sign using the eye bolts and position it slightly above the pole.

IMPORTANT ***Do not work underneath the sign at any time when it is supported from lifting eyes.***

The draw rope (or mains cable) will be protruding from the top of the pole. Open the door of the sign enclosure. Feed the rope / cable into the hole in the bottom of the sign enclosure. Manipulate the sign so that the four holes in its base align with the corresponding holes in the pole.

Fit the supplied anti-vibration washers to the bolts and insert bolts up through the holes in the stanchion top plate and into the sign.. Tighten nuts to the required torque (See Section 8.1).

Remove the eye-bolts from the top of the sign and stow within the sign to allow them to be fitted if the sign needs to be lifted in future.

IMPORTANT ***On removing the eye bolts, be sure to replace them with supplied bolts and fibre washers to prevent water from entering the sign.***

8.3.4 Connection of mains cable

See section 8.5.1

8.4 MULTIPOLE

8.4.1 Installation of Poles

On Elektra signs the poles are always placed towards the sign edges in order to permit the maximum possible maintenance access via doors on the rear. Regardless of the size of the sign, there will only ever be two mounting poles for a multi-pole Elektra sign.

This places restrictions on the placing of poles, which must be very accurately positioned.

For details on the required positions of poles Siemens drawing 667/CI/44010/000 should be consulted. It will be necessary to know the width and height of the Elektra sign to be installed, and then all the information relating to the position (including tolerance) of the poles may be calculated / established from this drawing.

To obtain a copy of this drawing 667/CI/44010/000 please contact Siemens Poole.

Depending upon the size and location of the sign, one of three pole diameters will be specified:

- 139.7mm dia
- 168.3mm dia
- 193.7mm dia

This can only be finalised after a site survey and subsequent confirmation from an approved structural consultant. This will normally be done after an order has been placed, but in some circumstances may be done at tender stage.

If there is any doubt as to the required pole diameter or position please contact Siemens Poole.

8.4.2 Installation of Sign

Prior to the install, the site area will have been prepared with hard-standing for the delivery vehicle. The foundations will have been prepared, poles erected and ducting provided with cable draw ropes present.

The sign is fixed to the poles using four U-bolts. The U-bolts interface with slotted brackets which are fitted before the sign leaves the factory.

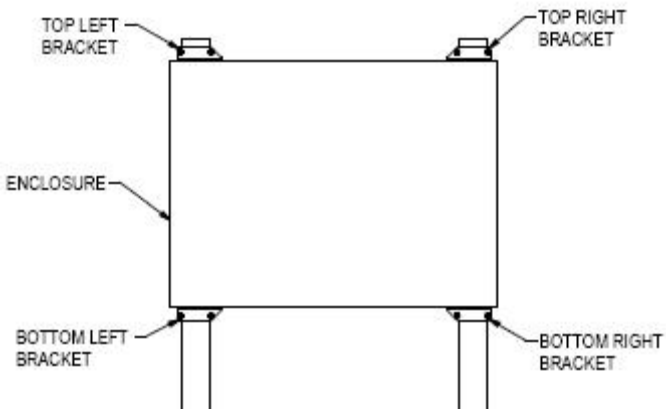


Figure 89 - Location of U-Bolt Brackets (View from front of sign)

The upper U-bolt brackets incorporate holes for the attachment of lifting shackles. The sign should only be lifted from these points. Suitable shackles must be fitted to these points prior to lifting the sign. One shackle should be fitted to the upper left hand bracket and one to the upper right hand bracket – DO NOT attempt to lift the sign from one end only.

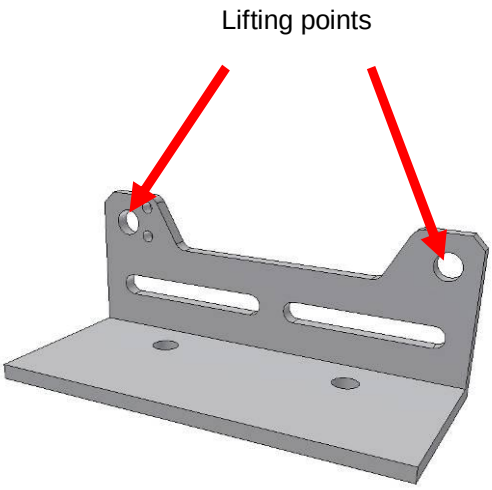


Figure 90 – Multipole sign lifting points

With the sign suitably supported, and before lifting the sign into position, loosely assemble the upper U-bolts with their associated parts (as supplied) to the brackets on the sign.

IMPORTANT ***Do not work underneath the sign at any time when it is supported from lifting eyes. Ensure suitable chocking / blocks etc in place at all times.***

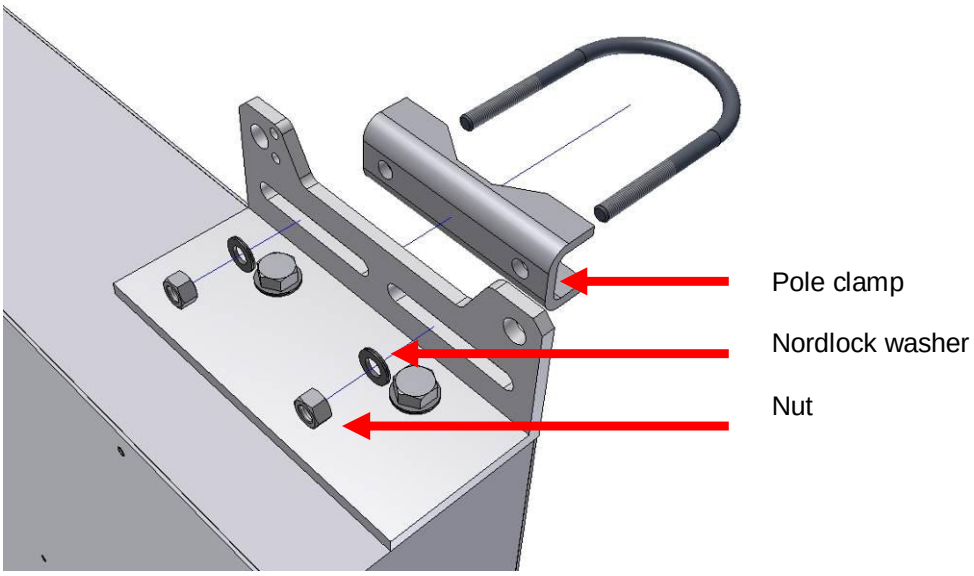


Figure 91 - Upper U bolt assembly

Lift the sign into position slightly above the final mounting height such that it may be lowered into position with the upper u-bolts around the poles. Care should be taken not to scratch the poles during this operation..

Figure 92 - Lifting sign into position

Ensure the enclosure is level and at the correct height then loosely tighten the nuts on the upper U-bolts.

Take the Pole Clamps for the lower u-bolt assemblies and, ***without placing hands or fingers between the sign and pole at any time***, position them behind the sign and loosely fit lower U-bolts, washers and nuts.

IMPORTANT	***Do not place hands between the pole and the sign during this fitting operation. Locate packing blocks between sign and pole to keep the parts apart during this operation***

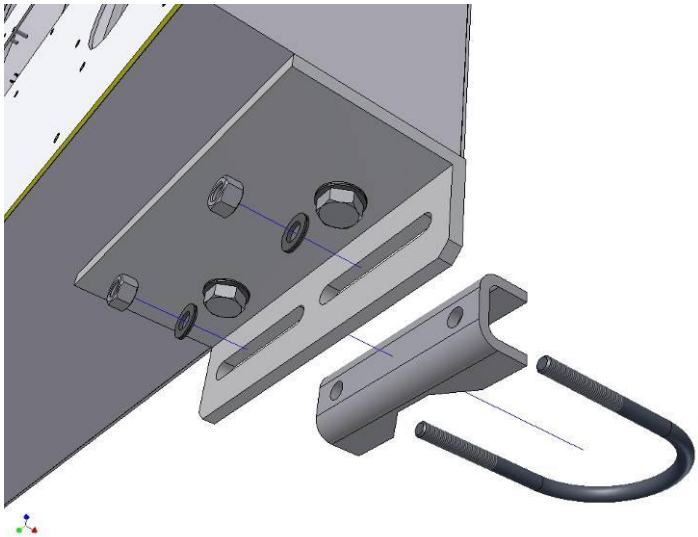


Figure 93 - Lower U-bolt assembly

When both lower U-bolts are loosely fitted, fully tighten U-bolt nuts to the required torque (see section 8.1).

Fully tighten upper U-bolt nuts to the required torque (see section 8.1).

Having released the tension on the lifting strops, remove the shackles from the upper U-bolt brackets
.

Figure 94 - Multipole enclosure fitted to the Poles

IMPORTANT ***Do not work underneath the sign at any time when it is supported from lifting eyes. Ensure suitable chocking / blocks etc in place at all times.***

8.4.3 Connection of mains cable

See Section 8.5.1

8.5 ELECTRICITY CONNECTION

The REC/DNO should be asked in advance by the customer to provide the supply including the cut-out during the first-fix period. If the supply is not present, field services may have to contact the customer to ensure that the supply is provided.

All Elektra signs are fitted with a lockable double pole mains isolator within the Master Switch Assembly (see Section 5.2.2.1).

In order to permit safe and sensible connection / isolation of the installation, Siemens recommend the fitting of a secondary, lockable, isolator in the feeder pillar, or similar, supplying the sign.

Siemens recommendations are as follows –

- If the distance between the feeder pillar and the sign is less than 25m a double pole isolator without MCB may be fitted. Siemens part number 667/7/44678/000 is available for this purpose.
- If the distance between the feeder pillar and the sign exceeds 25m a double pole isolator with MCB should be fitted. Siemens part number 667/7/44679/020 is available for this purpose.
- Armoured cable should be used for the connection between the feeder pillar and the sign. Siemens cable, part number 667/4/88346/060 is recommended for this purpose.

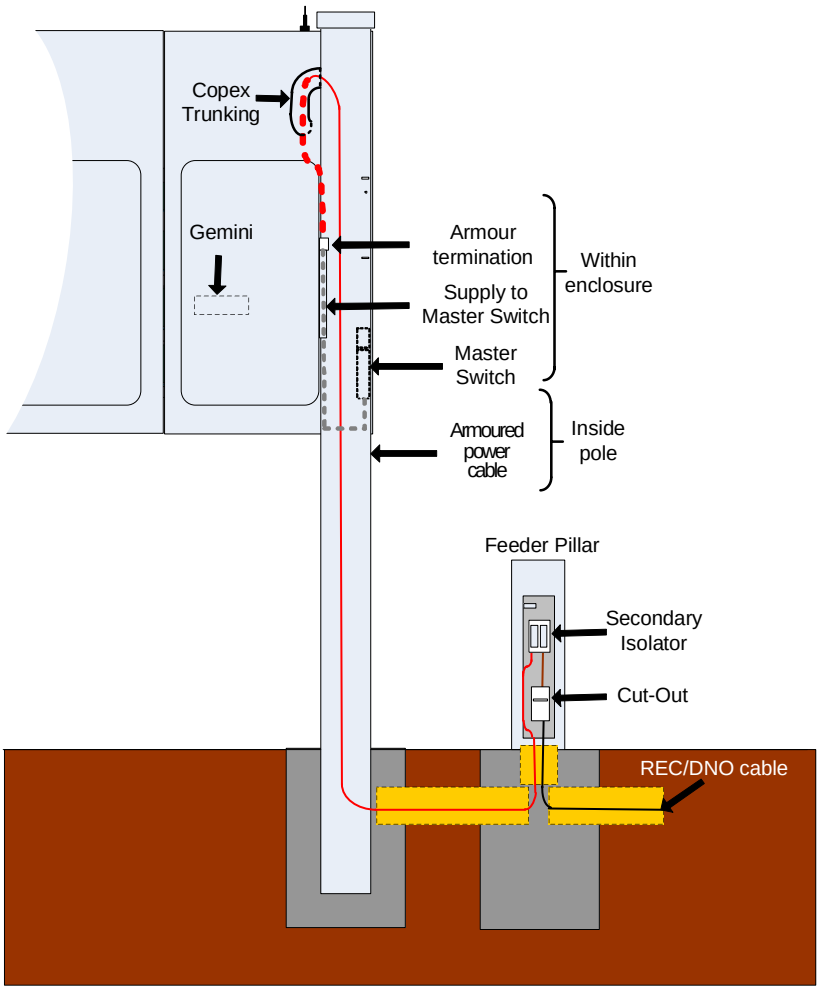


Figure 95 - Mains Connection Scheme

For some multipole signs, an optional belled pole may be available.

Note	Belled pole option is only available on a limited range of multipole sign sizes. It is NOT available for Monopole or Simple Monopole mounted signs

In the case of a belled pole, the electricity board cut-out may be mounted on the wooden board within the pole. In this instance Siemens recommends the fitting of double pole isolator 667/7/44678/000 to permit secondary isolation of the sign at ground level.

Access to a belled pole is with a tri-head key. The Earth Loop Impedance calculations in this handbook are based on an Isolator fuse rating of 25A.

8.5.1 Fitting and Termination of Mains Cable

Elektra signs may or may not be supplied with mains cable already attached to the sign, depending upon installation requirements at individual sites.

8.5.1.1 Mains Cable Supplied With Sign

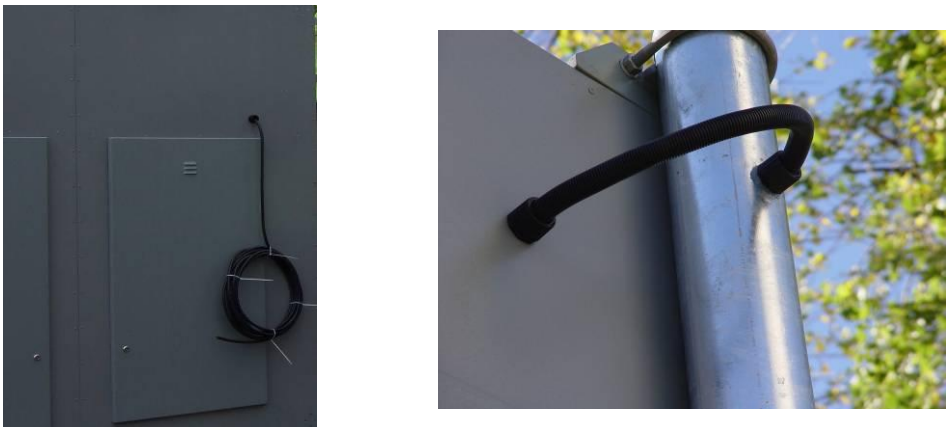


Figure 96 - Mains Cable Interface to Pole

In this case, the cable will have been fully terminated within the sign before leaving the factory. All that is required on-site is the connection of the cable to the electricity supply.

Uncoil the cable, and fit a suitable length of flexible trunking (copex – Siemens Part number 915/4/10315/004 is recomended)) over the cable followed by a gland suitable for the hole in the pole(Siemens part number 915/4/10316/000 is recomended)

Attach a draw rope to the cable. Check Risk Assessment and if safe to do so pull the cable through into the feeder pillar (G39 Authorisation required if cut-out installed in feeder pillar).

Fit gland to pole and ensure flexible trunking pushed into gland to effect water resistant seal.

If not already done so, mount the relevant double pole isolator (see section 8.5 above) adjacent to the electricity board cut out in feeder pillar.

Connect the sign to the output side of the isolator but do not connect the input side to the electricity supply until the tests described in section 10 have been performed.

IMPORTANT The feeder pillar / belled pole may only be accessed by an operative who is G39 trained and DNO/REC Authorised

8.5.1.2 Mains Cable Not Supplied With Sign

In cases when the cable is not supplied with the sign it must be pulled into place during installation of the poles, it will then be available for final connection during installation of the sign.

For a multipole sign this cable will be left coiled at the top of one of the poles, whereas for a Monopole or Simple Monopole it will be left coiled at ground level.

When providing the cable in this manner, it is important to leave sufficient cable length available for connection to the sign-

- For a Multipole sign a good 'rule of thumb' is to leave a length of spare cable equal to the height of the pole above ground level.
- For a Monopole or Simple Monopole sign a good 'rule of thumb' is to leave a spare length of cable (at ground level) equal to twice the final height of the top of the sign.
- The cable should be left suitably coiled to prevent damage prior to installation of sign.

The process for connection of the cable to the sign varies slightly with mounting option but is similar in each case.

Multipole

Uncoil cable at top of pole and if not already done pull cable through the gland hole in the pole.

Fit a gland suitable for hole in pole (Siemens part number 915/4/10316/000 is recommended) over the cable followed by a suitable length of flexible trunking (copex – Siemens part number 915/4/10315/004 is recomended) over the cable.

Feed the cable carefully through the gland on the rear of the sign.

IMPORTANT ***There are many delicate electronic components on the rear of the circuit boards in the sign. Extreme care must be taken when feeding the cable through not to damage any of the boards.***

Once the cable is fed through and into the sign, fix the gland to the pole and push flexible trunking into both glands to effect a water resistant seal.

Inside the sign, route the cable to the gland plate situated just inside the nearest door to the incoming cable gland.

Hold the cable against the gland plate and estimate the length of outer insulation and armouring to remove.

Strip cable armouring back for length as determined above.

Fit armoured gland to cable and locate on gland plate as shown in Figure 97

Figure 97 - Mains Cable Gland Plate

Run the stripped cable from the gland plate to the master switch unit.

Connect L, N and E cables as shown in Figure 98

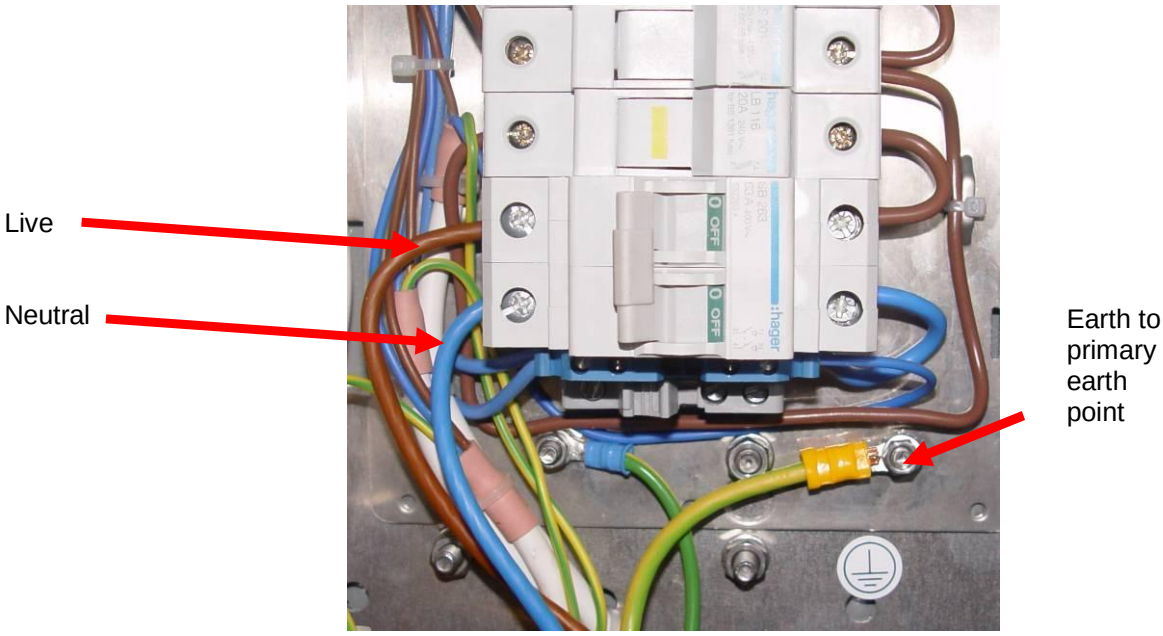


Figure 98 - Mains Cable Connection

Monopole

In this case, the cable must be fed up the cantilever pole and out through the gland hole when it is lying on the ground **before** it is lifted into position (See section 8.2.2)

Once the cantilever and sign are installed, the process is the same as for the Multipole sign described above.

Simple Monopole

In this case, the cable must be fed up the stanchion when it is lying on the ground before it is lifted into position.

As the sign is lifted into place the cable must be fed into the base of the sign.

IMPORTANT	***There are many delicate electronic components on the rear of the circuit boards in the sign. Extreme care must be taken when feeding the cable through not to damage any of the boards.***

Once the sign is fully fixed to the stanchion the cable is routed in a similar manner to that described above and connected to the Master Switch unit.

9 INSTALLATION – SECOND FIX

For this process the field operative must have full understanding of the G39/1 1992 engineering recommendation and be Authorised by the REC/DNO to remove the Cut-Out fuse carrier and connect to the outgoing side of the cutout.

The second fix installation process is usually performed by the Siemens field service team. The process involves safety electrical testing, electrical connection to the supply and then basic functional testing. At the end of the second fix the sign should remain powered.

9.1 VISUAL INSPECTION

Check the following items before commencing with the testing:

- Check there is no water within either the Elektra sign enclosure or the feeder pillar.
- Earth connections are securely made and the earth wires are not damaged.
- Check the main assemblies are securely fitted and no fixings have become loose in transit.
- Check that there is no obvious damage to any cable insulation or any enclosure damage that may have happened during first fix installation.

10 TESTING

IMPORTANT

No tests should be performed on the incoming side of the REC/DNO cut-out. Any operative who is to remove the cut-out fuse carrier or work in the vicinity of the cut-out, must have REC/DNO G39 Authorisation, be competent in relation to the sector scheme and the wear correct PPE.
All testing equipment must be in good condition, be calibrated and have fused leads that conform to GS38.

10.1 INSULATION TEST

Equipment

- Insulation meter
- Standard field service tool kit

This test is to be carried out before any connection is made to the electricity supply.

To perform an insulation test certain protection devices have to be removed. These protection devices are designed to intentionally conduct at high voltages, and this would cause a failure of the insulation test if they are not disconnected.

There are two protection devices that have to be disconnected. Firstly the Gemini mains connection has to be disconnected. This is the 10 way mains connection feed to the Gemini on the comms panel. Secondly the master switch cover has to be removed and the earth wire disconnected from the MOV module on the DIN rail. See Figure 99.

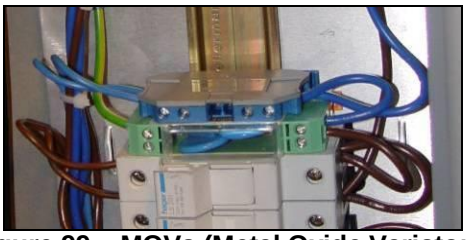


Figure 99 – MOVs (Metal Oxide Varistors)

Ensure the switches within the isolator and sign enclosure are set as indicated by the following table.

Switch/Fuse	State
Master switch circuit breaker box	
Master switch 63A	ON
Master fuse 20A	Intact
Heater fuse 10A	Intact
Sign switch 32A	ON
MCB maintenance socket 6A	ON
Fuse Gemini 5A	Intact
Fuse #1 10A	Intact
Fuse #2 10A	Intact
Fuse #2 10A	Intact
Double Pole Isolator	
Master switch	ON
MCB (if fitted)	ON

Table 2- Insulation Test Switch State

In the feeder pillar there will be line and neutral wires that will not as yet be connected to the electricity suppliers fused cut-out. As a precaution, use a meter to check that these wires are not energised before touching them (check the meter on a known source first).

Connect these line and neutral wires together.

Take the insulation meter and switch it to the 500V range.

Place one meter probe on the connected line/neutral wires and the other on the primary earth stud. Measure the insulation resistance. It must be greater than 10 MΩ. Record the measurement on the "Elektra installation checklist form".

At the end of the test return all the switches in the Double Pole isolator and master switch panel to the off position, replace/re-connect the protection devices and separate the line and neutral wires previously connected together.

10.2 POLARITY TEST

Equipment

- High voltage probes
- Multimeter
- Standard field service tool kit

The purpose of this test is to ensure that the line and neutral wires have been correctly connected by the electricity supplier and are not reversed.

An REC/DNO authorised operative will need to connect the outgoing side of the cut-out to the line and neutral conductors in the feeder pillar. The Correct G39 PPE must be worn.

IMPORTANT

Under no circumstances should any work or testing be carried out on the incoming connections to the REC cut-out. Any tests must be performed downstream of the REC cut-out fuse.

Initially make sure all switches in the master switch assembly are off.

Remove the electricity supply fuse carrier to ensure the circuitry is de-energised and wire the line and neutral wires to the outgoing side of the cut-out.

Now set the switches and fuses as follows:

Switch/Fuse	State
Master switch crt breaker box	
Master switch 63A	OFF
Master fuse 20A	Intact
Heater fuse 10A	Intact
Sign switch 32A	OFF
MCB maint skt 6A	OFF
Fuse Gemini 5A	Intact
Fuse #1 10A	Intact
Fuse #2 10A	Intact
Fuse #2 10A	Intact
DP Isolator	
Isolator switch	ON
Isolator MCB (if fitted)	ON

Table 3 - Polarity Test Switch State

Replace the electricity supply fuse carrier. Using a calibrated voltmeter/multimeter with leads conforming to GS38 measure the a.c. voltage between each of the pairs of points in the following table. Check the voltages are within the limits specified. If they are not a competent person needs to check the polarity at the feeder pillar. **Checks may only be carried out on the outgoing side of the cut-out with the fuse carrier in place. No attempt should be made to change the connections to the incoming side of the cut-out.**

Probe 1	Probe 2	Voltage a.c. (V rms)
Master switch input terminal – Line	Elektra primary earth stud	200 to 253
Master switch input terminal – Neutral	Elektra primary earth stud	< 10
Master switch input terminal – Line	Master switch input terminal - Neutral	200 to 253

Table 4 - Polarity Test Limits

Record the measurement on the “Elektra installation checklist form”.

At the end of the test return all the switches in the feeder pillar and master switch panel to the off position.

10.3 EARTH LOOP IMPEDANCE TEST

Equipment

- Earth loop impedance tester
- Standard field service tool kit

Earth loop impedance tests are carried out at points in the system where mains and exposed metal work are present. These are specified in Table 6 - Earth Loop Impedance Enclosure locations and values.

- The fault path within the installation comprises of the live conductors, control equipment and the Circuit Protective Conductor (CPC).

- The fault path external to the installation (Ze) contains the electricity supply authority's transformer windings, the live conductor and CPC of the electricity supply authority's distribution network, or the earth electrode.

The earth loop impedance test will include both elements described above.

The earth loop impedance test results are required to ensure that in the event of an earth fault (or a short circuit fault) the protection devices e.g. fuses will disconnect within the time limit as specified in BS7671 (IEE Wiring Regulations).

For fixed equipment such as the Elektra product, the specified disconnection time laid down by BS7671 is 5 seconds and for equipment connected via sockets the specified disconnection time is 0.4 seconds.

This test is carried out after the Electricity supply has been installed.

Ensure the switches within the feeder pillar and sign enclosure are set as indicated by the following table.

Switch/Fuse	State
Master switch crt breaker box	
Master switch 63A	ON
Master fuse 20A	Intact
Heater fuse 10A	Intact
Sign switch 32A	ON
MCB maint skt 6A	ON
Fuse Gemini 5A	Intact
Fuse #1 10A	Intact
Fuse #2 10A	Intact
Fuse #2 10A	Intact
Feeder Pillar	
Cut-out fuse	Intact
Isolator switch	ON
Isolator MCB if fitted	ON

Table 5 - Earth Loop Impedance Test Switch State

10.3.1.1 Earth tests within the Elektra enclosure

Connect the L1 (red) probe of the earth loop impedance tester to the line input of the Master switch and the E earth test probe (black) to the points described in the following table, measure the impedance and record the measured value.

L1 probe (red)	E probe (black)	Maximum impedance (Ω)
Master switch input terminal – Line	Master Switch Assembly Cover	1.84 Ohms
Master switch input terminal – Line	Elektra sign primary earth stud	1.84 Ohms
Transformer or SMPS supply input terminal - Line	Transformer frame or PSU enclosure close to its power input connector	5.93 Ohms
Gemini Supply at Gemini connector – Line	Comms panel metalwork	13.14 Ohms
Maintenance Socket MCB Output - Line	Earth pin of the maintenance socket	3.00 Ohms

Table 6 - Earth Loop Impedance Enclosure locations and values

The maximum impedance values are shown in the table. They are based on a 25A BS88 Cut-out fuse with a five second disconnect time. The values are obtained by taking the current that will blow the fuse within 5s (obtained from the IEE regulations) or disconnect the circuit breaker within 0.4s, and then using Ohms Law to find the required ELI. The result is multiplied by 0.8 to take account of possible ELI increases due to increases in temperature.

If the Electricity Supply fuse is greater than 25A, the required ELI values must be obtained by a competent person from the IEE regulations, based on the cut-out fuse rating and type.

IMPORTANT

If the measurements exceed these values do not proceed with further testing and report the supply as out of specification to the customer.

Record the measurement on the “Elektra installation checklist form” (Appendix A - Installation Checklist)

10.4 MAINTENANCE SOCKET RCD TEST

Equipment

- RCD tester
- Standard field service tool kit

Testing of an RCD is carried out in stages to establish correct operation. The first test is the no-trip test to check the RCD doesn't trip at low or nuisance current levels. The next test is to test the RCD at the rated tripping current and then finally a fast-trip test at five times the rated trip current of the RCD. These tests conform to the BS 7288 and BS 7671 standards.

Apply the following test to the maintenance socket.

10.4.1.1 No-trip test

Connect the RCD tester to the maintenance socket.
Apply half the rated trip current (15 mA) at 0 and 180 degree phase angles. Confirm the RCD doesn't trip.

10.4.1.2 Rated trip current test

Apply the rated trip current (30 mA) at 0 and 180 degree phase angles. Confirm the RCD trips in less than 200 ms.

10.4.1.3 Fast trip current test

Apply five times the rated trip current (150 mA) at 0 and 180 degree phase angles. Confirm the RCD trips in less than 40 ms.

Record the measurements on the "Elektra installation checklist form" (Appendix A - Installation Checklist)

10.5 COMPLETION OF INSTALLATION CHECKLIST

The installation checklist is provided in the appendix A of this document. At the conclusion of the installation Second Fix a completed copy of the installation checklist shall be provided to the Project Manager or Engineer. At the conclusion of the project this checklist will be given to the customer.

11 COMMISSIONING

11.1 TURN THE SIGN ON

Carry out a visual inspection and risk assessment.
Check that power is present at the sign.

Check that the Gemini “watchdog enable” link PL6 and the “capacitor on” link PL8 are in place.

Remove the plastic from under the Gemini coin cell to activate the power down RAM support function.

Turn on all the switches located in the Master Switch Panel after ensuring that the fuses are intact.

Remove the battery fuse that is attached to the front of the Gemini with insulation tape. Insert it in the “Battery fuse 5A” fuse holder in the front of the Gemini unit.

On the Elektra Master Switch Panel switch off the Gemini power switch. Confirm the Gemini unit still operates from battery power. Switch the Gemini back on.

11.2 POWER UP CHECK

Once powered observe the status indicators of the electronic modules within the Elektra sign.

The sign will go through a power up process. The length of this process will depend on how many display modules are fitted to the sign.

At the end of power-up check the following:

- Each Row Driver Board and Sensor Board within the sign has a unique address starting from [10] on the sensor module (See section 5.2.2.7) i.e. not showing [--].
- No red fault LEDs are illuminated on any of the Row Driver (See section 5.2.2.6) and Sensor (See section 5.2.2.8) Boards.
- The fault LED on the Gemini RS232/422 Converter is not illuminated (See section 5.2.3.8)
- LEDs on Gemini are in accordance with following table (For more detail see section 5.2.3.4)

Indicator	State
System	Slow Flashing green
Comms	Off
Watchdog	Off

Figure 100 - Gemini LEDs on Start Up

11.3 DIAGNOSTIC WEB INTERFACE CONNECT

Connect to the Gemini using either the 25-way connector or Bluetooth.

If this is the first time your PC has been used to connect to an Elektra sign in this way then it will be necessary to configure the serial and/or Bluetooth connections. These operations, and how to initiate a connection to the sign, are described in Appendices A and B of the GVP Reference Manual (667/HB/31760/000).

A login screen similar to Figure 101 will appear when initially opening the sign's webpages.

Figure 101 – Web Browser User Name and Password

11.4 CHECKING SIGN CONFIGURATION

Enter the username and password:

Username:
Password:

Note The username and password are distributed separately from this manual. Refer to Siemens Poole for details

If the username and password are correct the Siemens Outstation WEB interface window will appear as per Figure 102

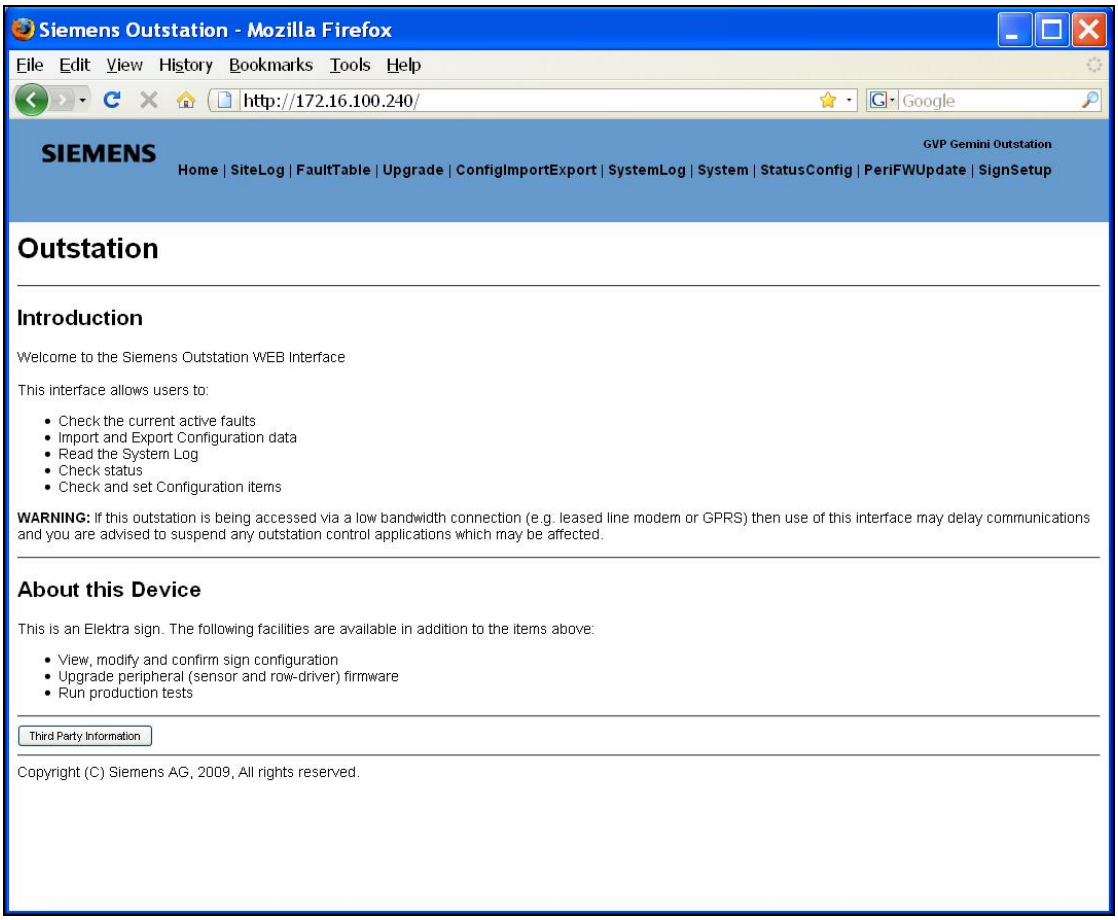


Figure 102 - Outstation initial login

Click on the |SignSetup| menu.

A table appears (as per Figure 103) that details the modules connected in the sign.

Verify that the table agrees with the physical number of modules identified within the sign.

Check that under the <Refresh> button the following text is displayed:

- Status: Running

Note – If any of the above stages do not occur as described, refer to Section 13.1

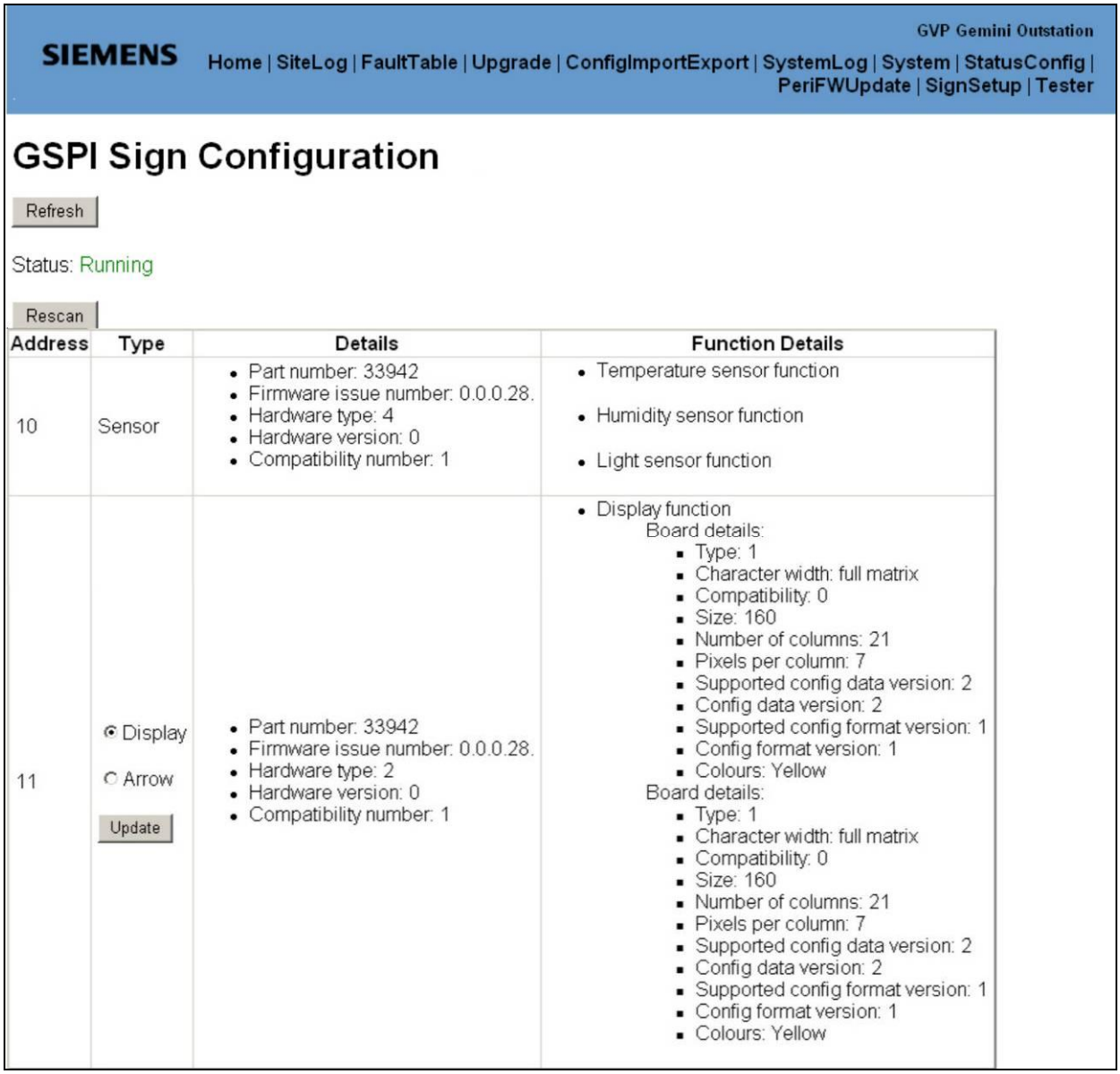


Figure 103 - Sign Configuration

For information on the meaning of entries in the above web page refer to Section 13.1

11.5 SETTING THE LUMINANCE PARAMETERS

During normal sign operation, the brightness of the whole sign needs to be uniformly adjusted in response to the level of ambient illumination. If the ambient light decreases, the LEDs must also reduce in brightness. Conversely as the ambient light increases, the LEDs must get brighter. In order to measure the ambient illumination, the Sensor Board receives an input from a light sensor which is normally situated at the top of the sign. As the ambient light level measured by the Light Sensor changes, Gemini instructs the Row Drivers to change the brightness of the LEDs on the Display Boards accordingly.

The method for changing the brightness of the LEDs is to rapidly switch them on and off at a rate that is not visible to the human eye. The ratio of the Off period to On period then allows control of the perceived brightness. This process is called Pulse Width Modulation (PWM)

The Row Driver has 3 PWM outputs that are independently controlled. This allows 3 types (colours) of LED to be operated per row, each type having its own brightness/PWM relationships. As a result of this, the PWM for Red, Green and Yellow LEDs can be controlled independently, which is essential as they have different characteristics.

ELEKTRA configurations include a single PWM setting for each of the illumination Bands. This is then modified by a certain percentage depending on the size of the displays and the colour of LEDs being driven.

Select the Luminance Band Web Interface page (see Section 13.11.5) and ensure that the Luminance Band settings correspond to those defined in Figure 104.

Band	UP Threshold	Down Threshold	Display PWM	Lantern PWM
0	13	11	60	60
1	132	108	400	400
2	1320	1080	1000	1000
3	7150	5850	3000	3000
4	19800	162000	9999	9999

Figure 104 - Luminance Band Settings

Select the Luminance Modifier Web Interface page (see Section 13.11.4) and ensure that the settings correspond to those in Figure 105 for the display type in the actual sign.

Board Type	Y100	G100	R100	Y160	G160	R160	Y240	Y320	LANT
PWM Id	**0**	**1**	**2**	**0**	**1**	**2**	**0**	**0**	**0**
Band	**MOD**	**MOD**	**MOD**	**MOD**	**MOD**	**MOD**	**MOD**	**MOD**	**MOD**
0	197	190	142	233	308	233	238	192	208
1	98	93	69	126	150	115	121	95	115
2	96	90	65	125	150	110	120	95	110
3	123	103	78	160	177	143	157	127	147
4	100	100	100	100	100	100	100	100	100

Figure 105 – PWM Modifiers

The MOD values for luminance band 0 and for the particular size of display being used should be entered into the fields in the screen shown in Figure 106. This should be repeated for the other luminance bands.

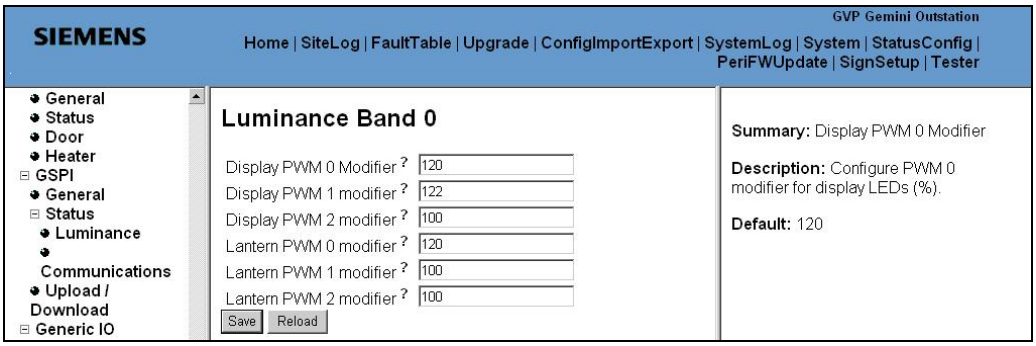


Figure 106 - Luminance Band Modifier entry

11.6 COLOUR SELECTION FOR RED / GREEN DISPLAY MODULES

Ignore this section for signs with Yellow displays.

For signs with Red/Green displays the default colour for all text is Green.

Reddening of special words is enabled and disabled using the Web Browser *Special Words Compare Facility* option on the StatusConfig->UVMS Library->General configuration page.

Tick the ‘Special Words Compare Facility’ box to enable this feature, as shown in Figure 107

Note that the performance of this feature can be modified using the ‘Separate Special Words’ tick box, also shown in Figure 102

When not ticked, ‘words’ are set to red even if they form part of a larger word

e.g. *Full* would display as *Full*

When ticked, words are only set to red if they are discreet, complete words with no adjoining characters

e.g. Successfully would display as Successfully

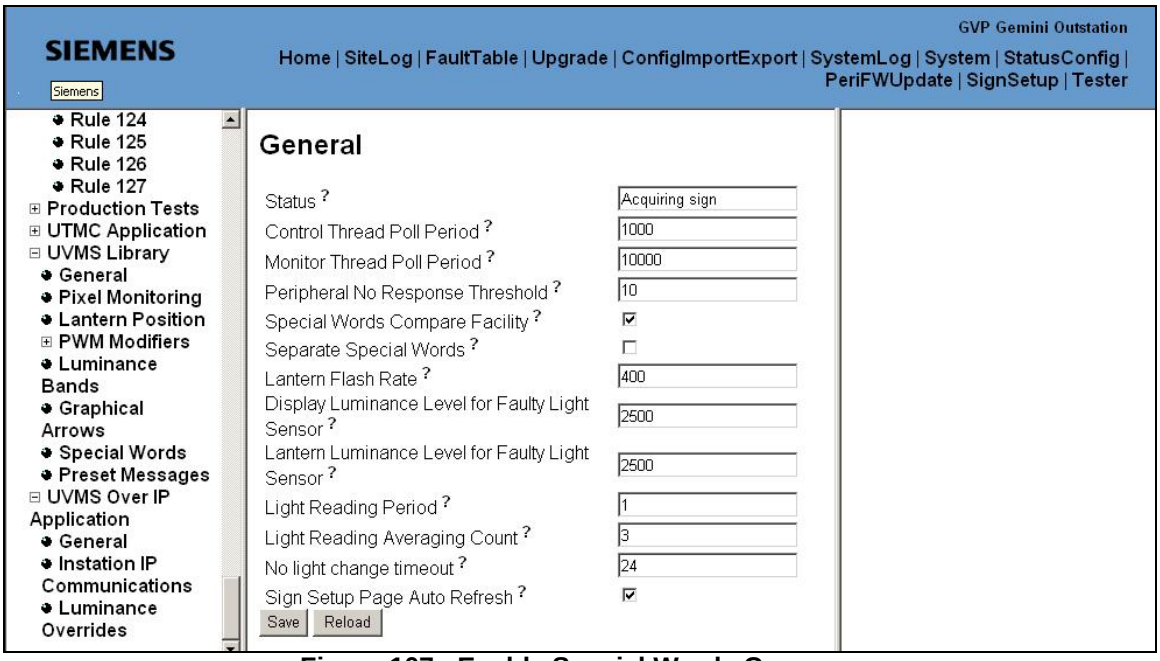


Figure 107 - Enable Special Words Compare

The special words themselves are defined on the StatusConfig->UVMS Library->Special Words configuration page, as shown inFigure 108. If no words are configured then no words will be red. It is important to check that these words correspond with the legends that the instation is using.

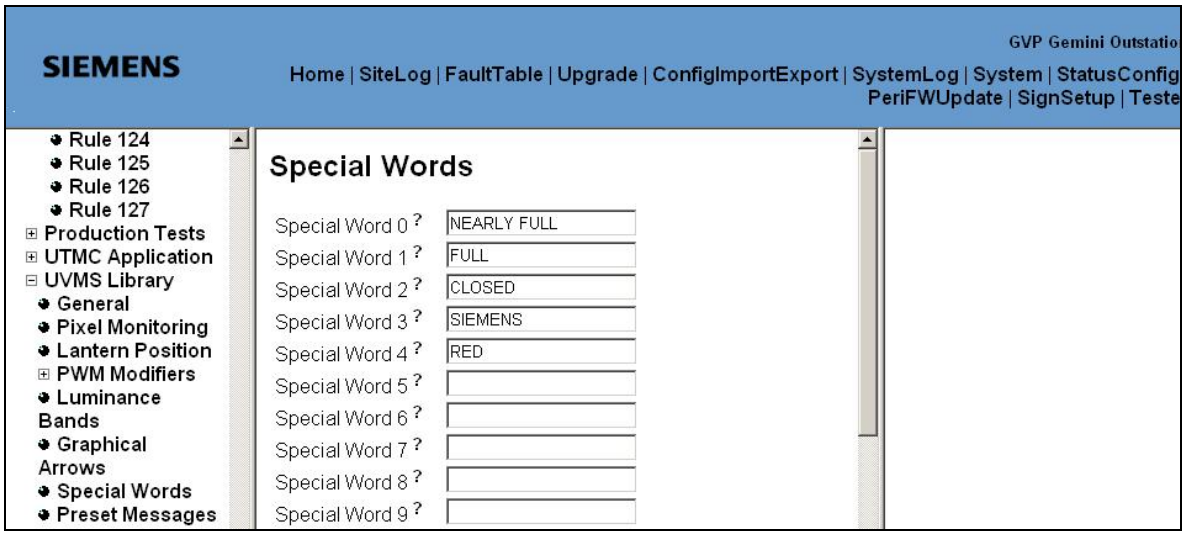


Figure 108 - Specify Special Words

11.7 HEATER TEST

Click on the |StatusConfig| menu. On the left of the screen a vertical menu appears. Select “Environmental Monitor/Heater”.

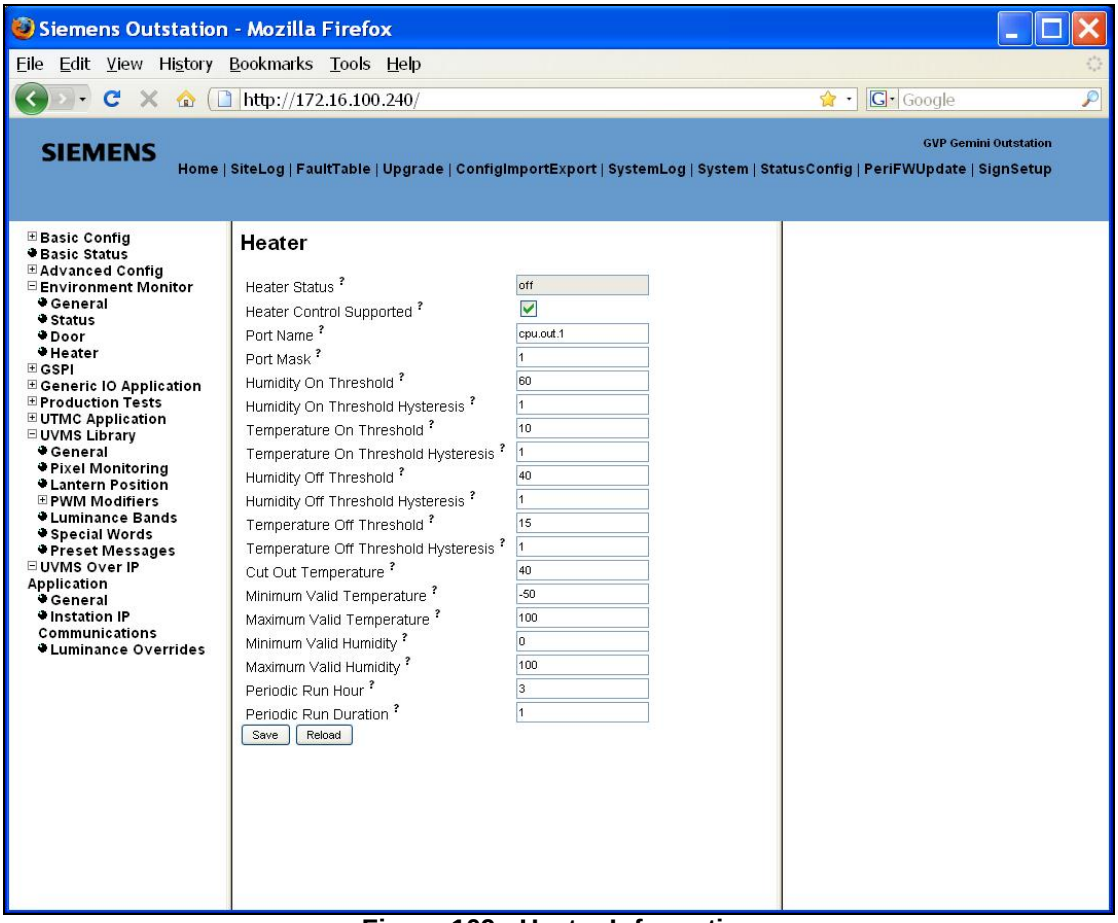


Figure 109 - Heater Information

Note the current settings. Change them to the following and click <Save>.

Description	Value
Humidity on threshold	0

Verify that the heater relay LED illuminates and that the heater wire for each row is warm to the touch.

Uncheck the checkbox “Heater control supported”. Confirm that the heater relay LED extinguishes.

Return the “Humidity on threshold” value to its previous setting and ensure the “Heater control supported” checkbox is ticked.

11.8 LIGHT SENSOR TEST

Click on the |StatusConfig| menu.
On the left of the screen a vertical menu appears. Select “Environmental Monitor/Status”.

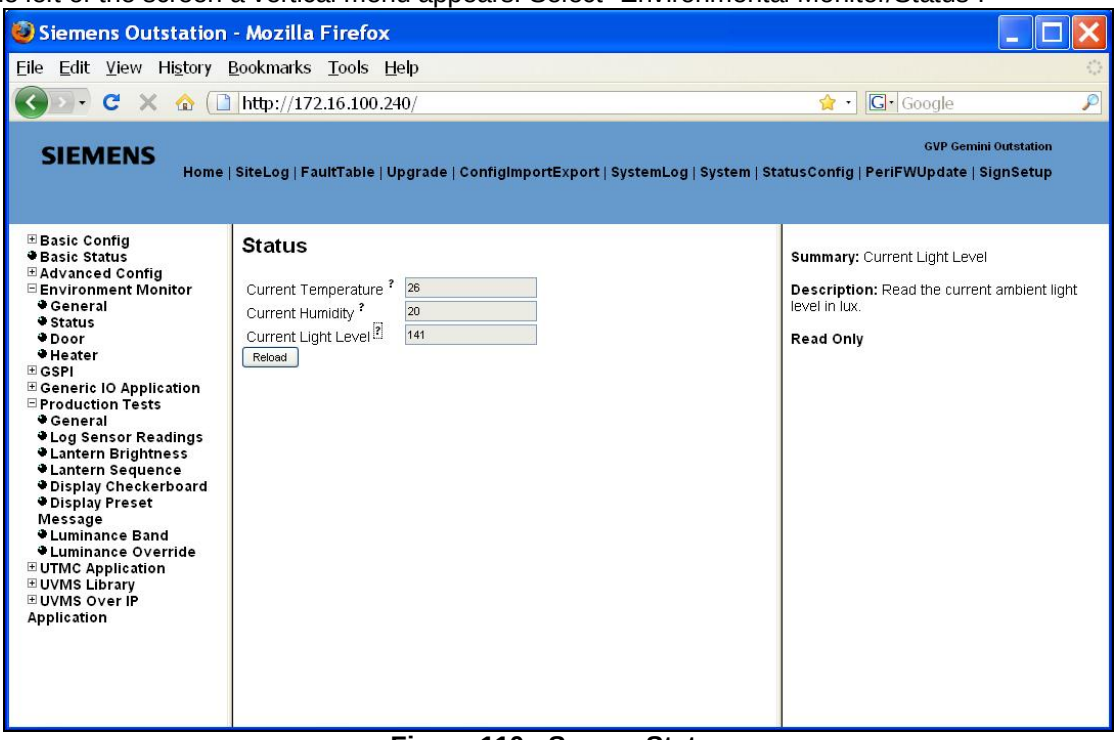


Figure 110 - Sensor Status

Confirm that the “Current light level” measurement value is a reasonable value for the prevailing conditions. Refer to the Table 7 for typical lux values. A light level that is significantly different to the table below can indicate an obscured or damaged light sensor.

Conditions	Typical illuminance (lux)
Night	0 – 5
Street lighting	5 – 40
Dark overcast day	1000 – 2000
Average overcast day	2000 - 7000
Full daylight (not direct sun)	10,000 – 20,000
Direct sunlight	30,000 – 130,000

Table 7 - Typical Lux Values

11.9 DISPLAY TEST

Click on the |System| menu.

Under the Applications heading you will see a list of all the applications that can be run on Elektra.

Stop any applications that are running.

Click the button <Start> next to the Tester application entry.

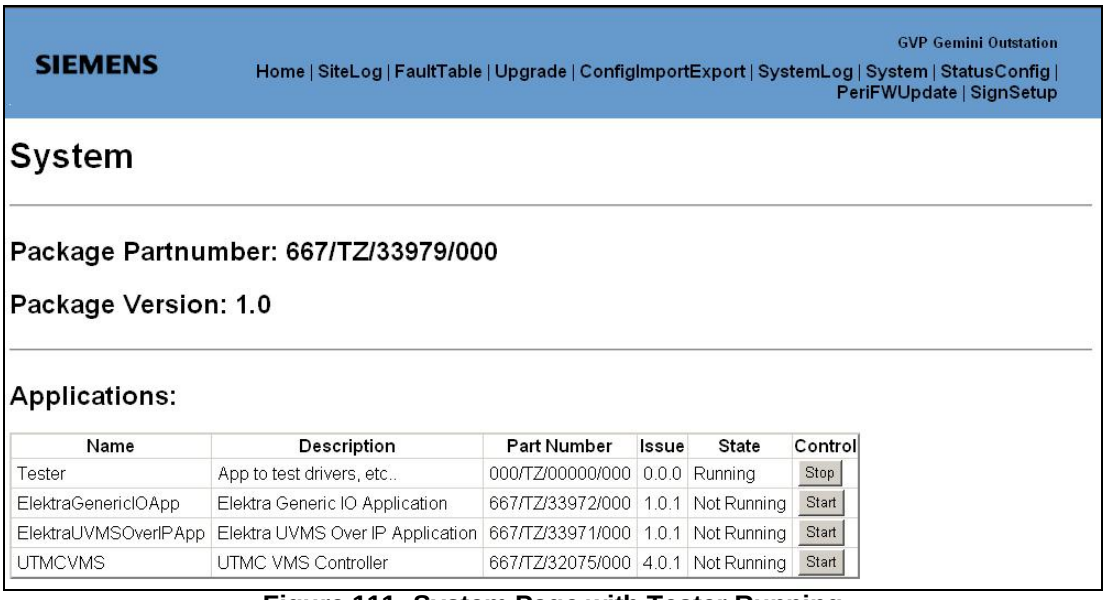


Figure 111 -System Page with Tester Running

When the Tester application is running a new menu entitled |Tester| appears in the header bar at the top of the web interface window.

Click on the |Tester| menu.

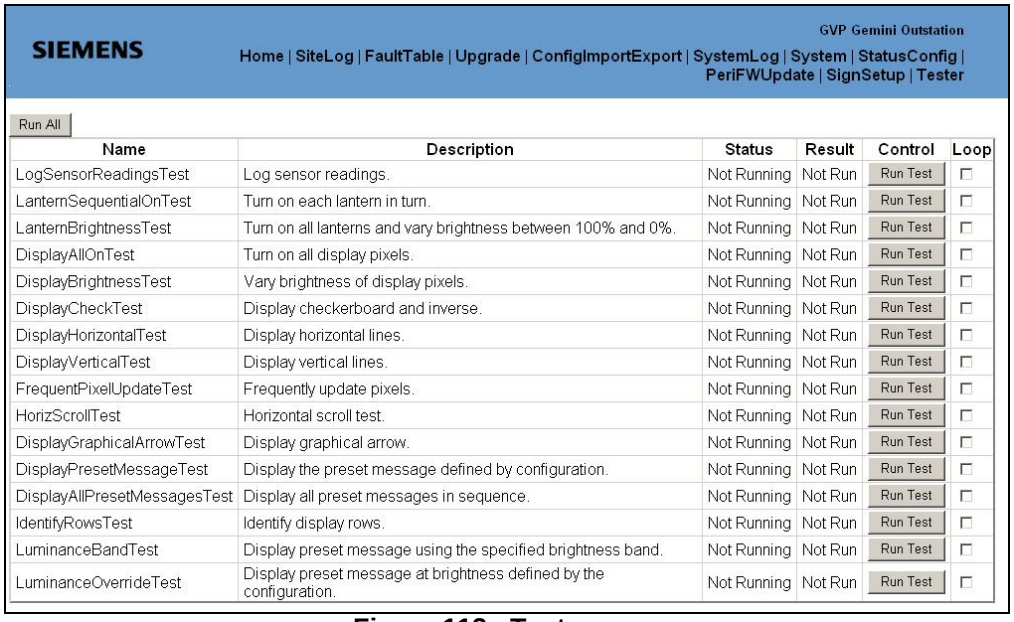


Figure 112 - Tester page

Check the ‘loop’ checkboxes for the following tests:

- DisplayCheckTest
- LanternSequentialOnTest

Click on the <Run Test> button for both these tests.

Confirm that the sign display performs as expected (full detail of tests may be found in Section 13.4 of this document)

Whilst the tests are running, check fault table is clear and there are no unexpected faults in the System Log.

At the end of the tests, remove the ticks from the 'loop' tick boxes and WAIT FOR THE SIGN TO FINISH THE TEST SEQUENCE. Status will then be Not Running for each of the tests.

Select the |System| menu and then click <Stop> next to the Tester application to stop it.

Check fault table is clear and there are no unexpected faults in the System Log.

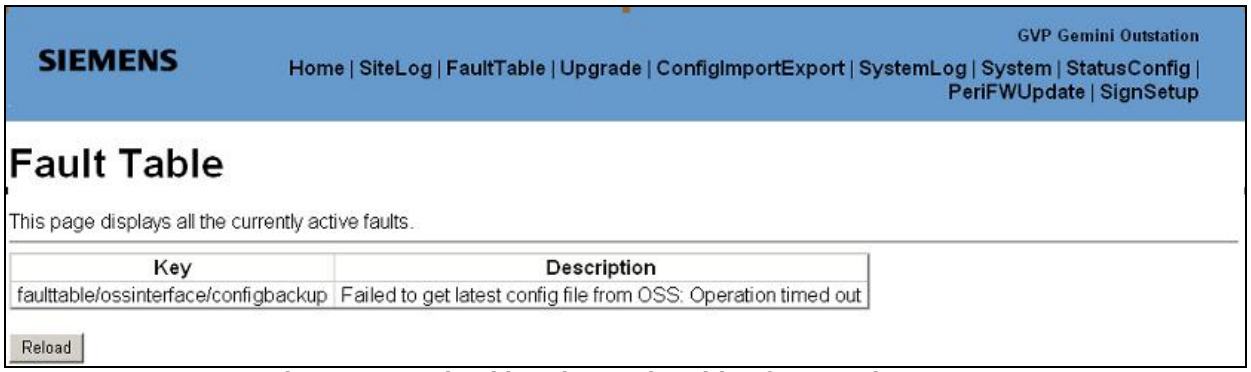


Figure 113 - Checking the Fault Table after running tests

11.10 CHECKING THE STATUS OF THE MC35 GPRS MODEM

Ensure that the SIM has been inserted and that the power is connected.

The MC35 Diagnostic LED is used to indicate the following states. One the sign is communicating with the instation, the LED state should indicate there is data transfer.

Operating State	LED
Immediately after power up	On for 2 seconds
Network Search or no SIM card inserted or no PIN entered or no GPRS network available	Flashes approx 2 seconds on 2 seconds off
Found GSM network - ready to connect	Flashes once every 4 seconds
Found GPRS network - ready to connect	Flashes twice every 4 seconds
Data Transfer	Flashes on for 1 second when data is transferred (this usually replaces the single flash every 4 seconds).

Figure 114 - MC35 LED Indications

If it is initially not possible to achieve communications on the GPRS network, the RJ12 power connector should be disconnected and then re-inserted.

11.11 MEASURING SIGNAL STRENGTH AT MC35 MODEM

If it is required to establish the siganal strength received by modem, the procedure here should be used. This procedure can be used for Radio Survey purposes as well as troubleshooting.

This requires a terminal (Laptop with Hyperterminal or Techterm device) to be plugged directly into the MC35. The MC35 must be fitted with a valid SIM card for the relevant Service Provider.

This procedure can be carried out at an installed Car Park or VMS Outstation or using the equipment shown below for a portable Radio Survey setup.

(The battery used was a Yuasa NP7-12 charged up on VDO Outstation. This will run the MC35 for an extended period and is not too heavy to carry)

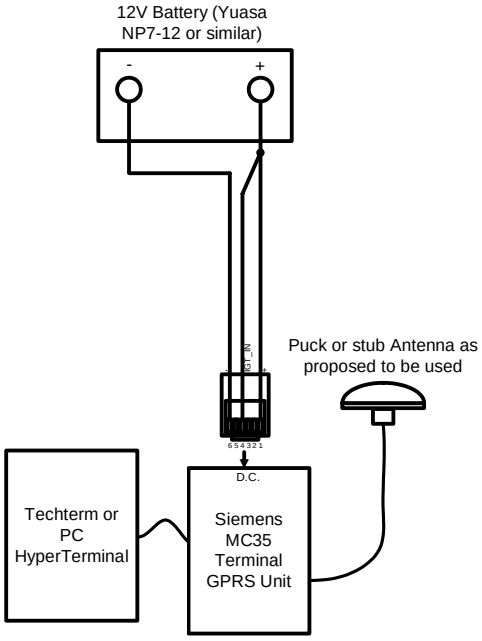


Figure 115 - MC35 Signal Strength Measurement Equipment

1) Configure the terminal for 9600-8-N-1 No flow control (use CTRL-SHIFT-F1 on Techterm for setup display)
2) Switch on MC35. Ensure that the PIN has been disabled (see previous section). Alternatively use CPIN=xxxx<cr> to enter PIN.
3) Wait for MC35 LED to flash briefly indicating that it has logged onto the network.
4) Enter AT+CSQ<cr>. Response will be +CSQ: x,y where x indicates the signal level :

Value of x	Meaning
0	-113dBm or less
1	-111dBm or less
2-30	-109dBm to -53dBm
31	-51dBm or greater
99	Not known or not detectable

- A value of 12 or more is required. Less than this and calls may be dropped.

11.12 CONFIGURING SIGN FOR EXTERNAL CONTROL

11.12.1 Graphical Arrows

ASCII strings are used to control which Graphical Arrow to display. Where Graphical Arrows are to be used it is necessary to ensure that the sign and the external control use consistent strings to represent the arrows. The strings recognised by the sign are configured using the web page described in section 13.11.6.

11.12.2 Elektra Control Modes

Elektra can be controlled in one of four ways:

- over a UTMC interface
- over a UVMS interface
- by parallel IO (UTC interface)
- by internal test functions

A GVP application exists for each method of control. The application appropriate to the method of control required should be configured and then started. Only one control interface should be enabled at any time so only one application should be in the running state at any time.

The configuration required depends on the application chosen.

11.12.2.1 Configuration of UTMC Application

The UTMC Application is configured using the following:

- SNMP configuration web page – see section 13.5.11 for description. The fields on this page should be set to match the configuration of the instation being used to control the sign.
- UTMC Application configuration web pages – see section 13.10 for description. The Sign Setup pages (section 13.10.4) should be configured to match the sign and the remaining pages used to match the configuration of the instation.

11.12.2.2 Configuration of UVMS Application

The UVMS Application is configured using the following:

- UVMS Application configuration web pages – see section 13.12 for description. The fields on this page should be set to match the configuration of the instation being used to control the sign.

11.12.2.3 Configuration of IO Application

The IO Application is configured using the following:

- Generic IO Application configuration web pages – see section 13.8 for description

The preset messages to be displayed also need to be configured. This is done in two parts:

- define the preset messages using the Preset Messages web page (one of the UVMS Library configuration web pages) described in section 13.11.8
- define the rules which map the IO input patterns to the message required using the Message Rules web page described in section 13.8.4

11.12.2.4 Configuration of Tester Application

The tests run by the Tester Application are configured using the following:

- Production Test configuration web pages – see section 13.9 for description

11.12.2.5 Starting Applications

Applications are started using the System web page. Applications are started and stopped using the buttons in the *Control* column. Note that only one Application should be running at any time.

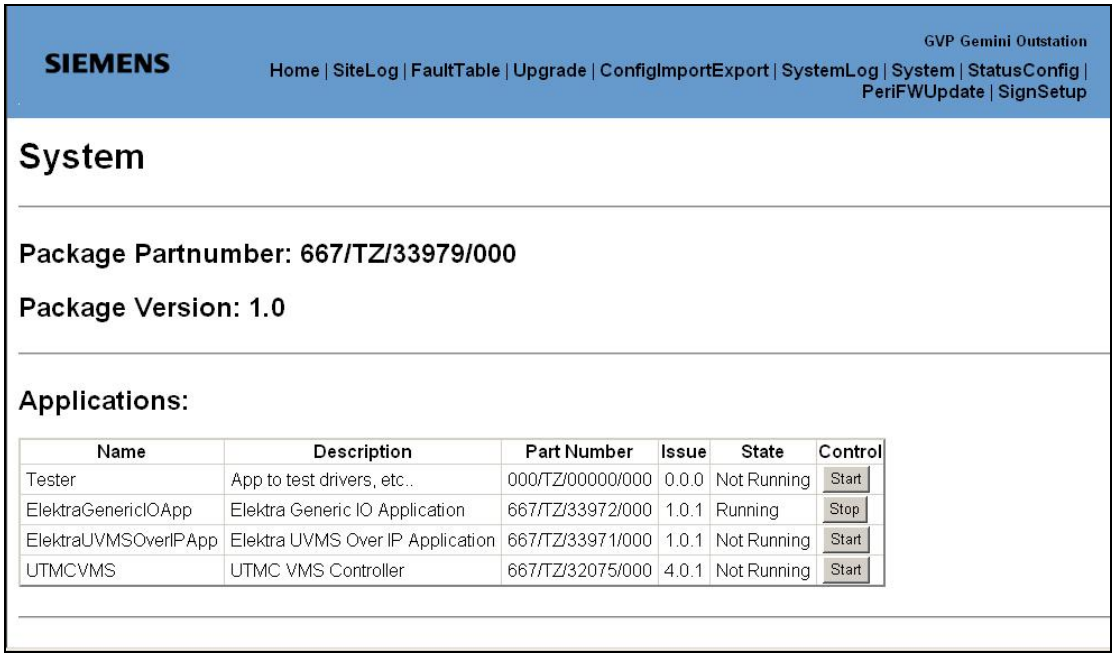


Figure 116 - Running the Generic I/O application

11.13 SETTING A LEGEND FROM THE INSTATION.

If the signs are being controlled from a COMET or Siespace Instation, the sign can be manually set to display a particular legend as detailed below. This procedure may be carried out by the customer, Poole support team or the project Engineer. The Commissioning Engineer should remain on site to verify sign operation.

The system allows an operator with sufficient permissions to override a sign, causing the system to ignore automatic application settings and remote systems settings.

To override the legend displayed on a sign, select "Manual Settings -> Set Legend" from the sign context menu. The following window is then displayed:

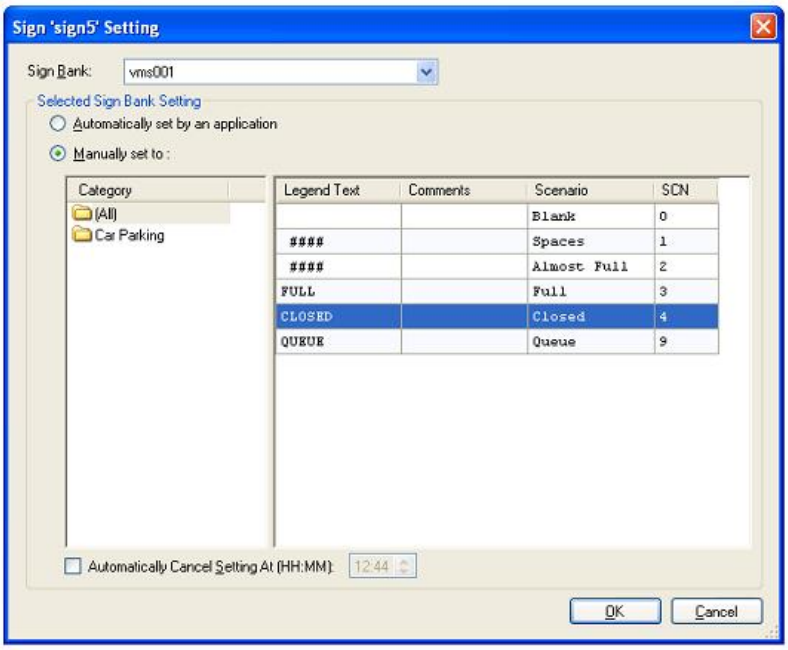


Figure 117 - Setting the Sign from the

To manually (force) the sign to a particular legend

1. Select the display element from the drop down list at the top of the window. (note: only the current selected element can be set at a time)

2. Select the 'Manually set to:' radio button.

3. Select the legend that you wish to force the sign to display. The list contains the legends that are available on this sign.

4. If you would like the override to expire automatically (and revert to automatic application or remote system settings), select the 'Automatically Cancel Setting at' checkbox and enter the time at which the override should be cancelled. This time defaults to 1 hour in the future.

5. Click on the 'OK' button to send the new setting to the sign.

The Sign should then be observed to check that the Legend is displayed. The Gemini Fault table and the System Log should be checked for faults. The Instation should also be checked for faults associated with the sign.

It is sensible to choose legends to exercise as much of the functionality of the sign as possible, including graphical arrows if fitted.

12 MAINTENANCE

12.1 ROUTINE MAINTENANCE

The maintenance scheme described by this manual is the manufacturer's recommended maintenance routine to ensure that the Elektra product operates reliably throughout its operating lifetime.

12.2 CLEANING

Every PI (Periodic Inspection) should include the cleaning of the exterior of the sign.

This should be completed with a sponge saturated with a pH neutral mild detergent solution. Do not use solvents to clean the sign surfaces

Before washing inspect the sign for any failure of the seals or holes in the enclosure. If there are any do not continue until the sign has been repaired

The surface is gently wiped and the sponge regularly squeezed and replenished to avoid any aggressive rubbing or the surface.

If possible the sponge should be attached to a pole to avoid working at height.

12.3 YEARLY INTERVALS

Inform the Customer you will be carrying out work on the sign. Clean the exterior of the sign. In areas of high pollution or where grime accumulates on the surface of the sign the cleaning interval may have to be reviewed and cleaning more frequent.

Check the enclosure is intact and the door locks are secure.

Inspect the sign for any sign of traffic damage, pay particular attention to the support columns and mounting brackets.

Inspect the enclosure and support columns for paint damage. Repair as necessary.

Check for the interior of the sign for evidence of water ingress. Repair as necessary.

Check the air filters in the rear doors are intact and permit the flow of air.

Tighten any fixings as required.

Inspect the wiring in the MDU (the operative must be G39 Authorised to do this) and the sign enclosure. Look particularly for insulation damage, overheating and check that the wires are terminated securely.

Check the condition of the modules within the sign eg. PCBs, batteries, electrical assemblies, heaters. Look particularly for the following:

- damage
- scorching
- signs of overheating
- corrosion or deterioration
- secure mounting
- firm mating of connectors
- breakages
- missing parts (covers, screws etc)
- safety labelling is intact

Functionally test the sign to confirm that all LEDs can be correctly illuminated and extinguished (see 11.9). Repair as necessary.

Check the light sensor is operational (see 11.8).

Check the heater is operational.

Check the antenna is firmly attached and is intact.

Before using maintenance socket in either the sign enclosure or the MDU the RCD must be tested but pressing the button marked “T” or “Test”.

Inspect the fault log. Note and rectify any faults reported.

Perform a battery hold-up test. On the Elektra master switch panel switch off the Gemini power switch and confirm that the Gemini and its modem remain powered for a minimum of five minutes. If the unit loses support within five minutes the support battery must be replaced.

12.4 THREE YEARLY INTERVALS

At three yearly intervals both the yearly inspection should be carried out and also the electrical testing detailed in the installation section of this manual. The customer must be consulted before this takes place. This maintenance shall include the following tests:

- Insulation test (see 10.1).
- Polarity test (see 10.2).
- Earth loop impedance test
- Maintenance socket RCD test
- BS 7671 requries that the results of this inspection and test shall be recorded and passed on to the customer.

After the first inspection and test the competent person carrying out the inspection may recommend that the interval between future inspections be increased or decreased as a result of the findings of the inspection.

Following the inspection the following wear-out items should be replaced.
Replace the sign air filters.

Where necessary the following maintenance can be applied to address particular problems but with normal operation this action shouldn’t be required.
Grease the door seal with silicone oil to prevent it from sticking.
Oil the hinges and door stays as necessary.

12.5 DIAGNOSTICS AND FAULT FINDING

Wherever possible the repair engineer should use remote diagnostics to determine the fault with the Elektra sign. The Web interface provides many diagnostic abilities which will allow a fault to be identified before travelling to site. This will reduce the repair time and improve safety as the repair engineer will spend less time on site diagnosing the problem.

12.5.1 Fault Diagnosis

The full list of Elektra specific fault table codes can be found in section 12.5.2. This section gives some examples of how to determine the cause of some of the more likely faults.

12.5.1.1 Gemini fault monitoring

The Gemini software is responsible for monitoring its own fault status and that of the peripheral boards. This fault status information can be accessed from the web interface. The Gemini periodically (every 10 seconds by default) requests status information from each of the peripheral boards. The status replies from the peripheral boards include fault information.
The Row driver boards are responsible for reporting faults associated with Display/Lantern boards and their associated power supplies.

All faults are recorded in a system log on the non-volatile Gemini FLASH file system, and current fault status is maintained in a fault table. The system log contains a history of faults encountered while the fault table contains currently active faults. A list of Elektra specific fault table entries can be found in section 12.5.2.

Only faults that require immediate action in order to prevent damage or to safeguard the user result in actions being taken by the boards themselves. In all other cases, the Gemini is the master arbiter, gathering all hardware faults status and issuing actions accordingly.

The System log and fault table can be accessed using the web interface. This can be achieved using a laptop either remotely or locally. They can also be viewed with a handset using the 'WIZ' command.

12.5.1.2 Display Board Pixel faults

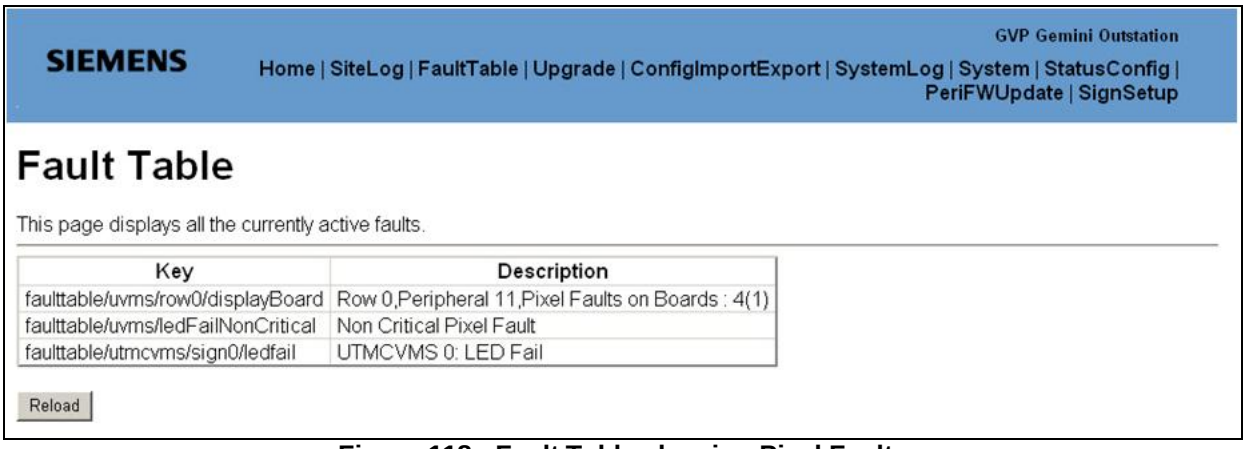
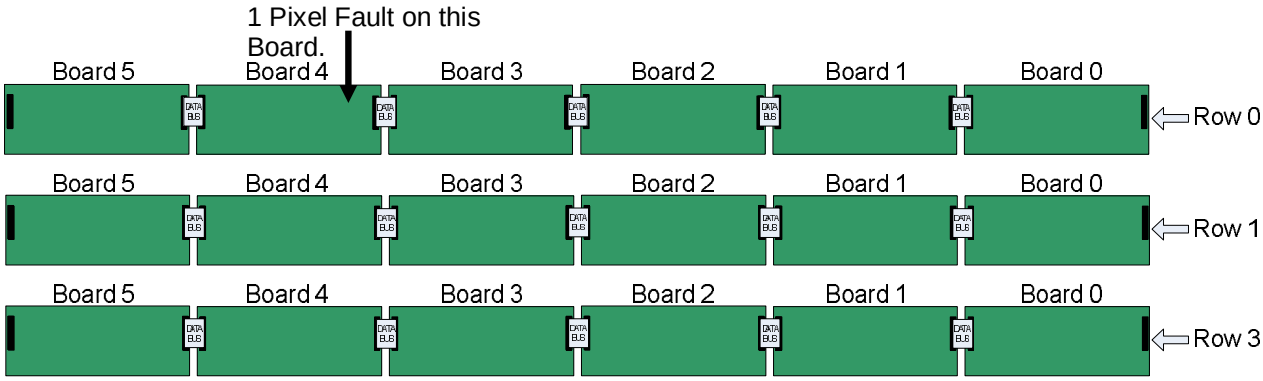


Figure 118 - Fault Table showing Pixel Faults

The information in the fault table shown above indicates that there is a single pixel fault on Row 0 (first row) board 4. It states that it is a Non Critical Pixel Fault. A critical pixel fault occurs when the number of pixels which have been requested to be illuminated but are faulty in any single displayed character is greater than or equal to the configured threshold. Pixels not requested to be illuminated have no effect on the determination of a critical pixel fault.



Viewed from the rear

Figure 119 - Locating a Display Board Fault

The System Log provides more detail. In the example shown inFigure 120, the Faulty Pixel is specified as being in Row 1 and at position 63,3.

- The 63 indicates that the fault is in the 63rd column, counting from zero at the extreme left hand end of the row when viewed from the front of the sign (or from the right hand side when viewed from the rear).
- The 3 indicates that the fault is in LED row 3, where row zero is always at the top of the board when viewed the right way up

The diagram shows how the position of the faulty pixel is identified. It is also specified as being “Non-critical”. Please note that Pixel ‘Rows’ and ‘Columns’ start at 0.

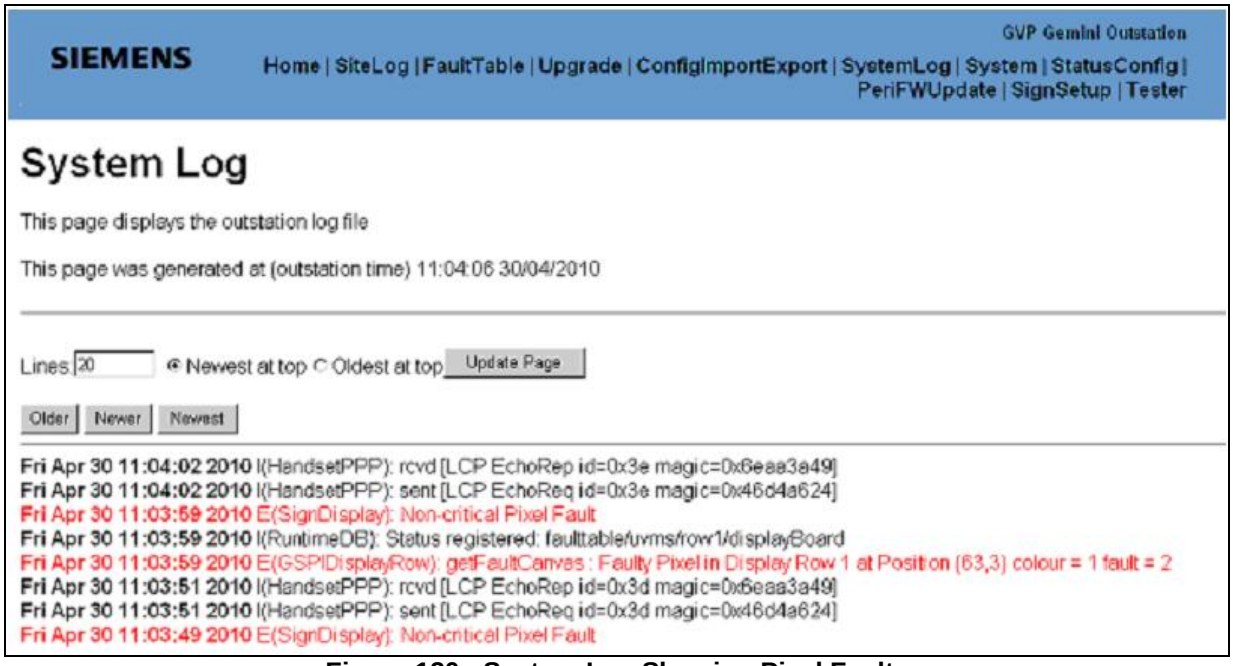
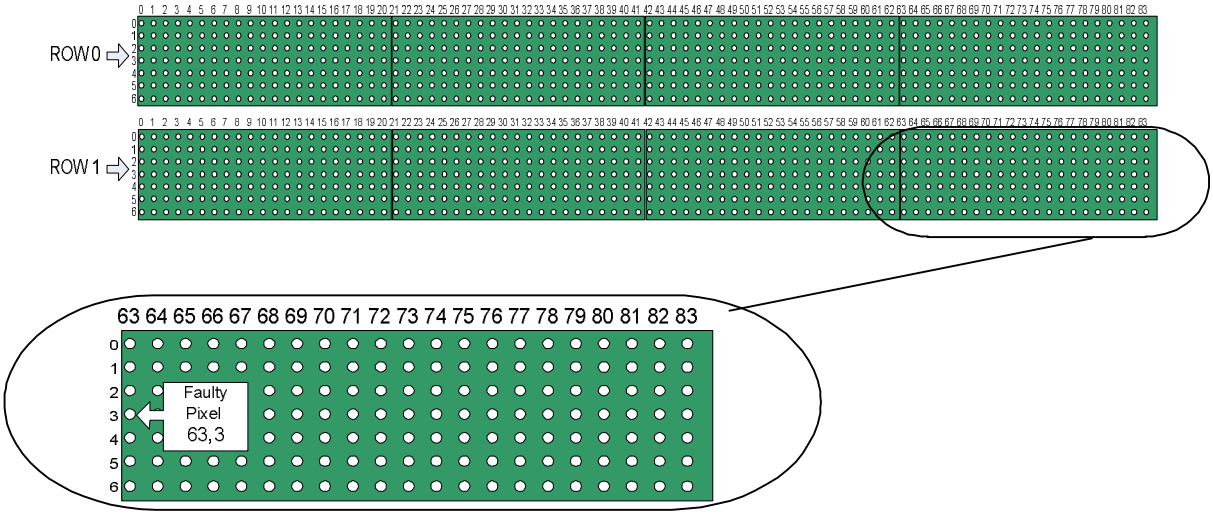


Figure 120 - System Log Showing Pixel Faults



Viewed from the front (LED side of board)

Figure 121 - Locating a Yellow Pixel Fault

Figure 120 and Figure 121 above illustrate the example of when Yellow Displays are being used. A faulty Yellow Pixel is indicated by “colour = 1 fault” in the system log. This is the only ‘colour’ code possible on a Yellow sign.

The situation is slightly different on a Red/Green sign -

Figure 122 and Figure 123 both indicate a pixel fault at the same position (65,2), however “colour =2 fault” indicates a Red LED/Pixel. “Colour = 4 fault” indicates a Green LED/Pixel.

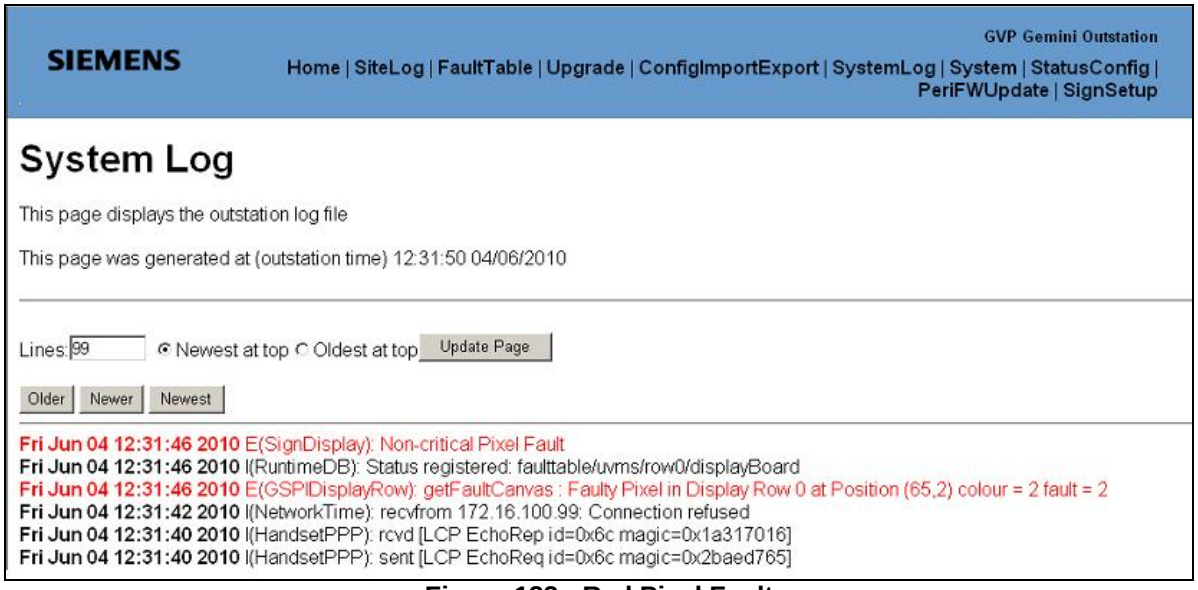


Figure 122 - Red Pixel Fault

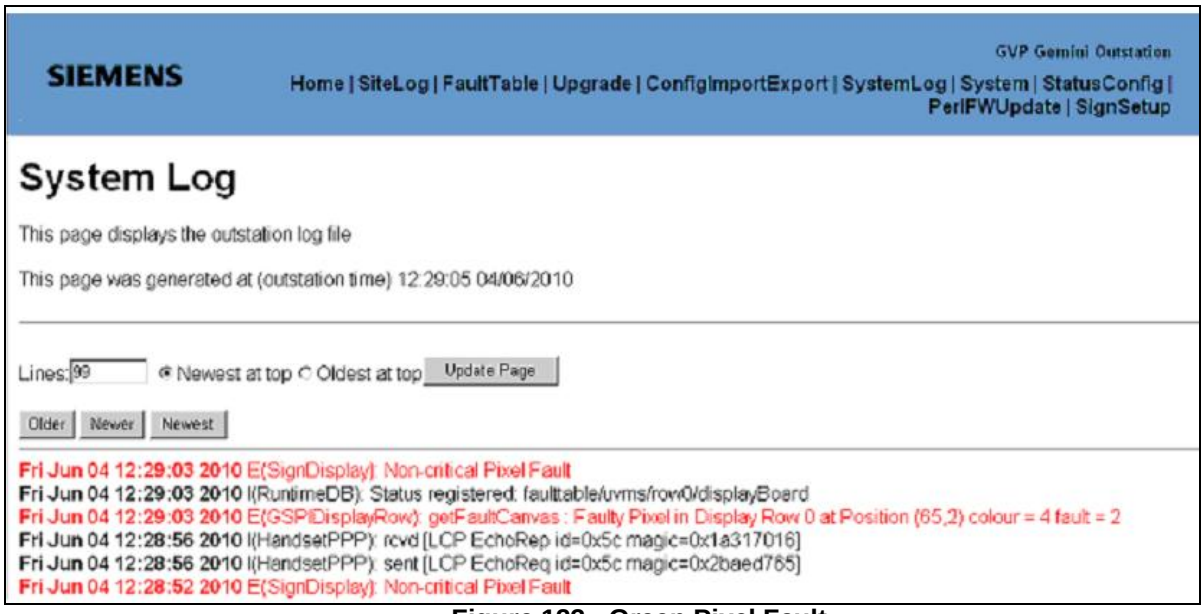
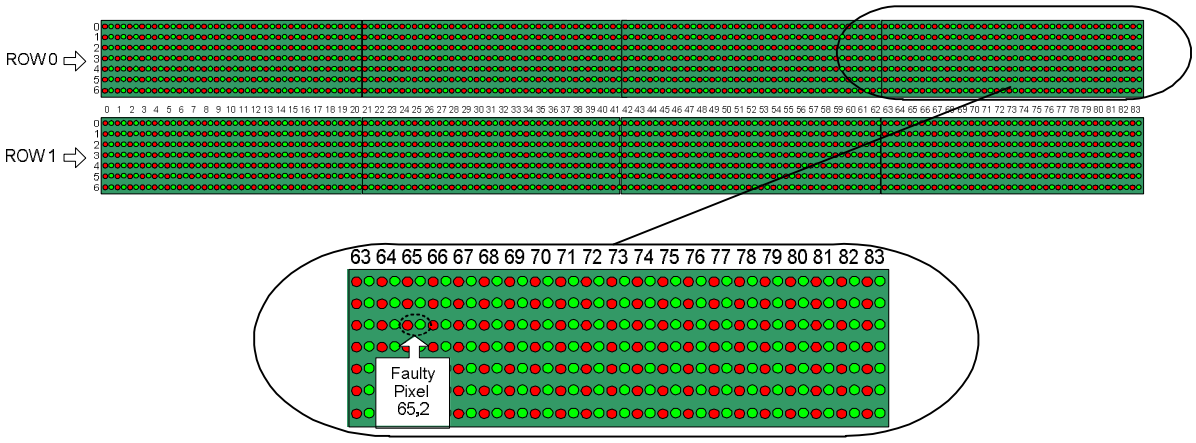


Figure 123 - Green Pixel Fault

Figure 124 identifies the pair of LEDs described by “Faulty Pixel in Display Row 0 at Position (65,2)”.



Viewed from the front (LED side of boards)

Figure 124 – Locating a Red/Green Pixel Fault

12.5.1.3 Sign Configuration Faults

If there is a display module missing or a ribbon cable unplugged the sign will indicate that the actual sign does not match the stored configuration on the SignSetup web page as shown in Figure 125. By scrolling down the page the details of each board detected can be viewed and compared against what should be fitted. If the stored config is found to be correct and the sign does not match it, the sign should be repaired and then the "rescan" button used to initiate a rescan (this causes the configuration of the sign to be reassessed). If the sign is found to be correct, ‘set to discovered config’ should be selected.

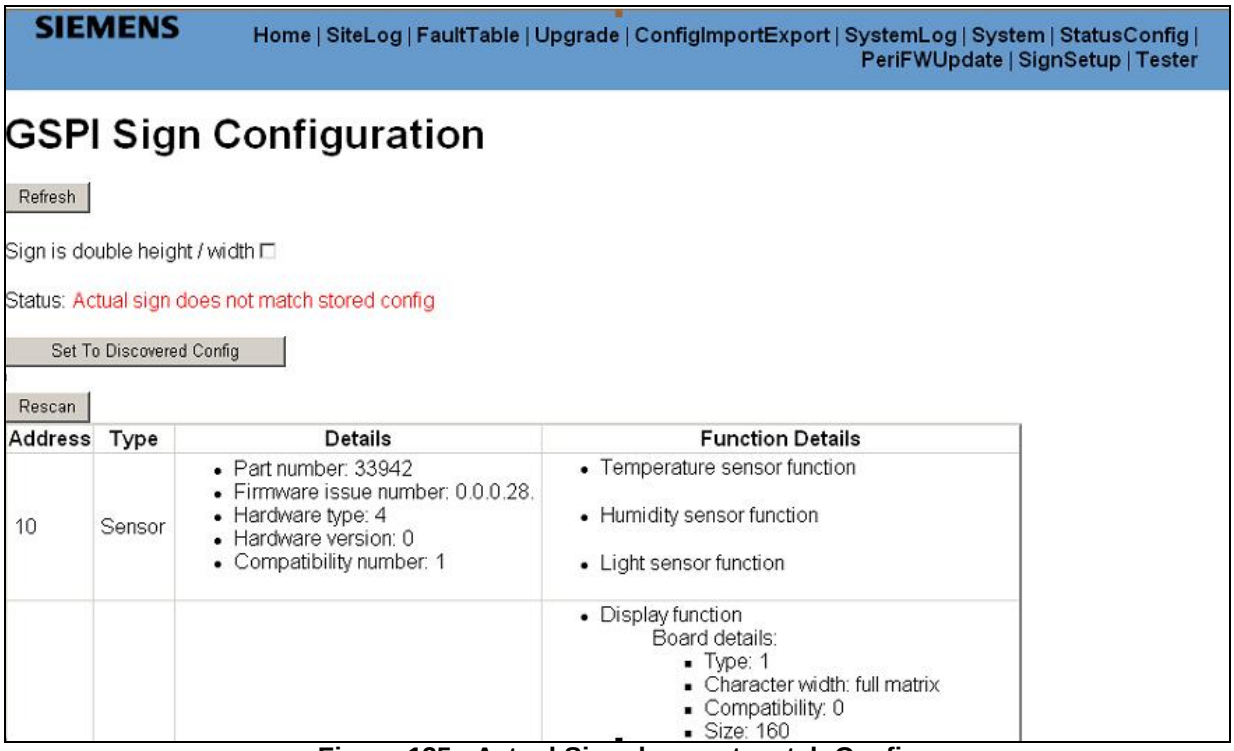


Figure 125 - Actual Sign does not match Config

The Fault Table and System Log shown below give the type of fault information that could be returned as a result of a faulty or disconnected light sensor.

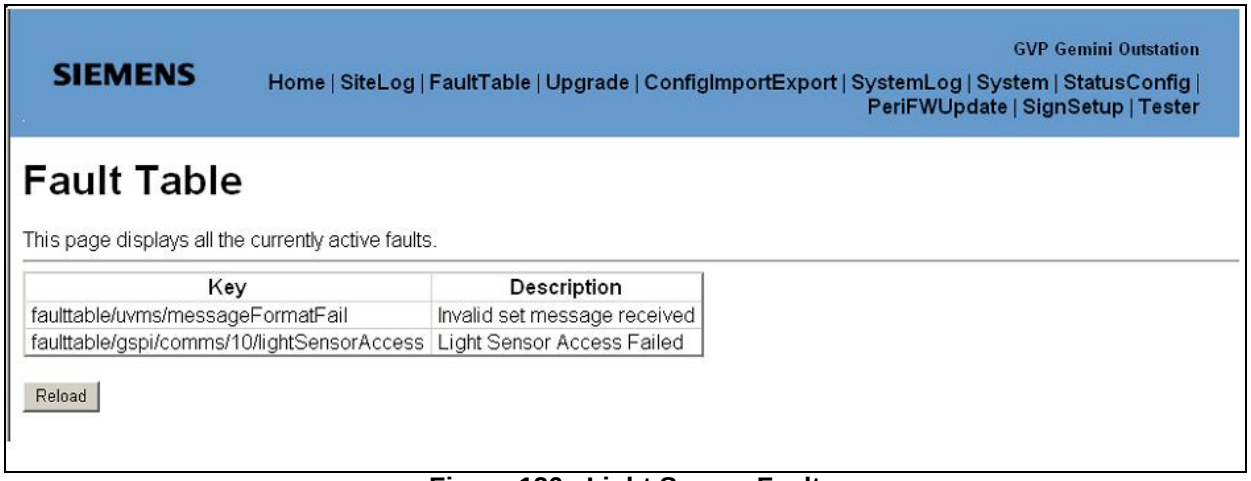


Figure 126 - Light Sensor Fault

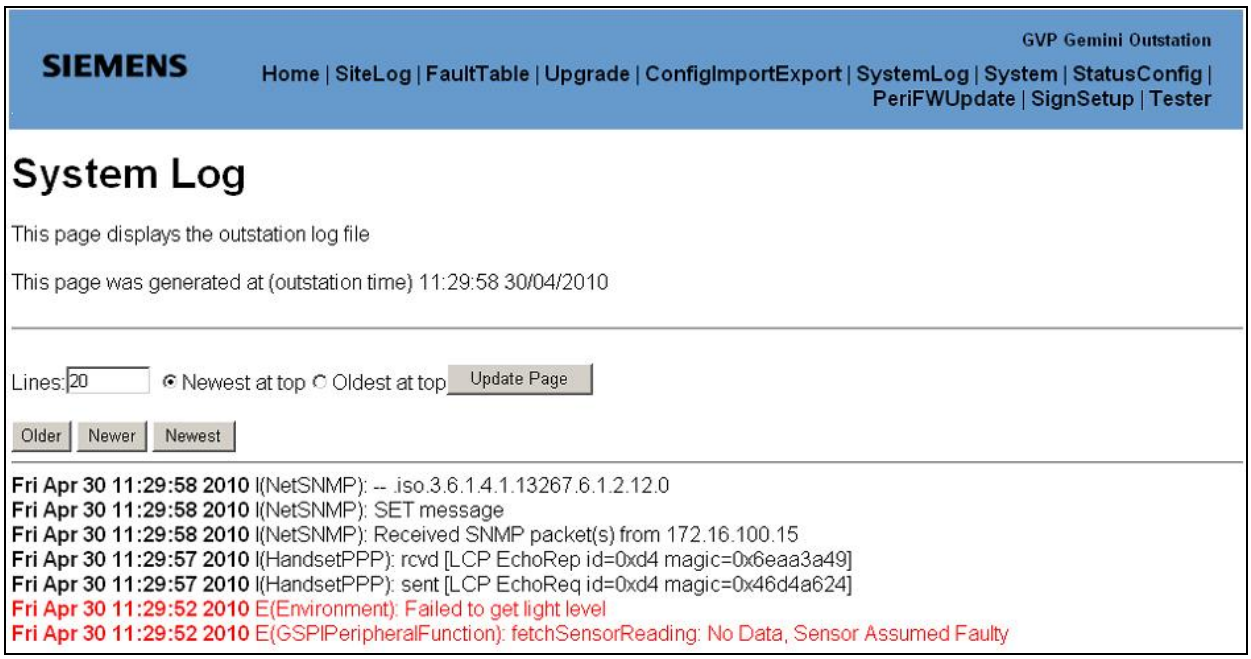
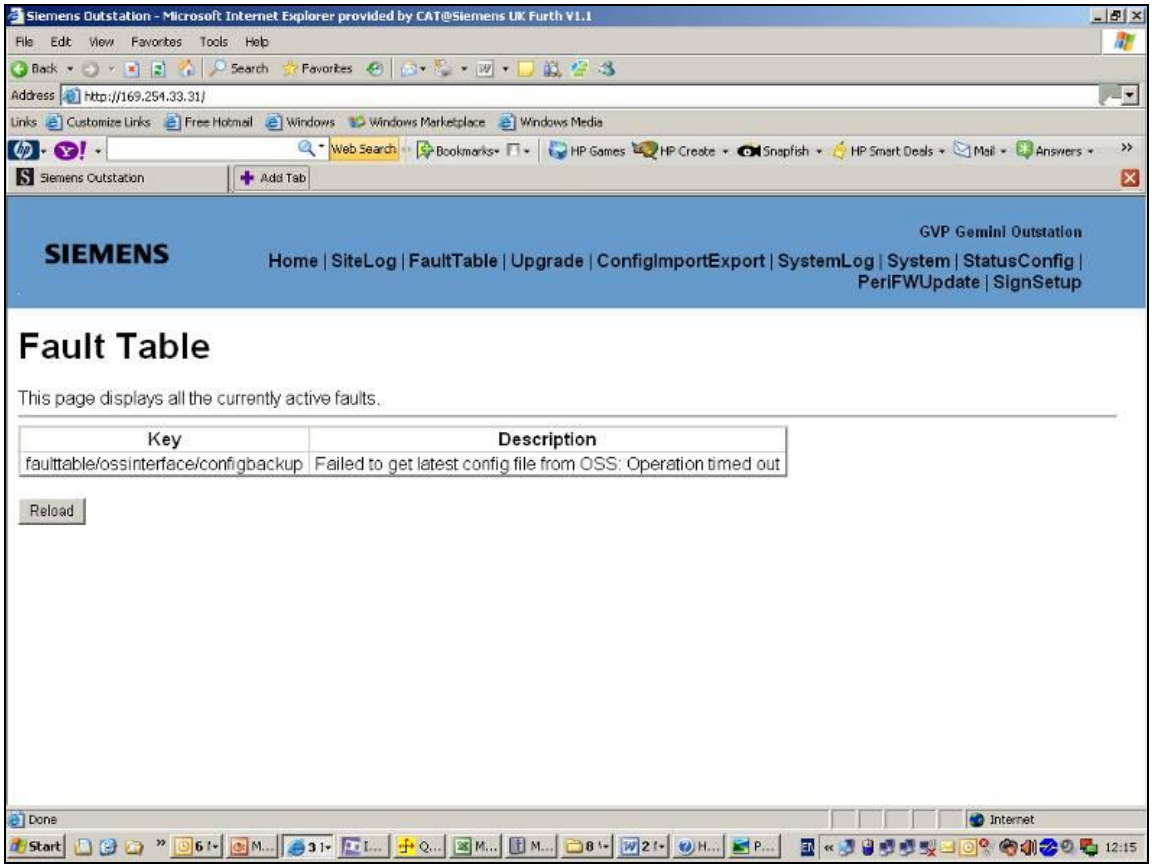


Figure 127 - Light Sensor Fault System Log information

12.5.1.4 Communications Failures

If the Gemini is unable to communicate with the OSS, the following fault information may be displayed.



An internal Communications failure usually indicates that the Gemini cannot communicate with the rest of the sign. Figure 128 illustrates loss of communication with the peripheral with address 11 (gspi/comms/11/rxNoReply). This would probably be caused by the CAT5 lead between peripherals 10

and 11 being disconnected or faulty but could also be caused by peripheral 10 or 11 being faulty. In this case the UTMC application is running and it has also detected the fault (utmcvms/sign0/internalcomms). This is an example of a single fault leading to more than one fault being reported in the Fault Table.

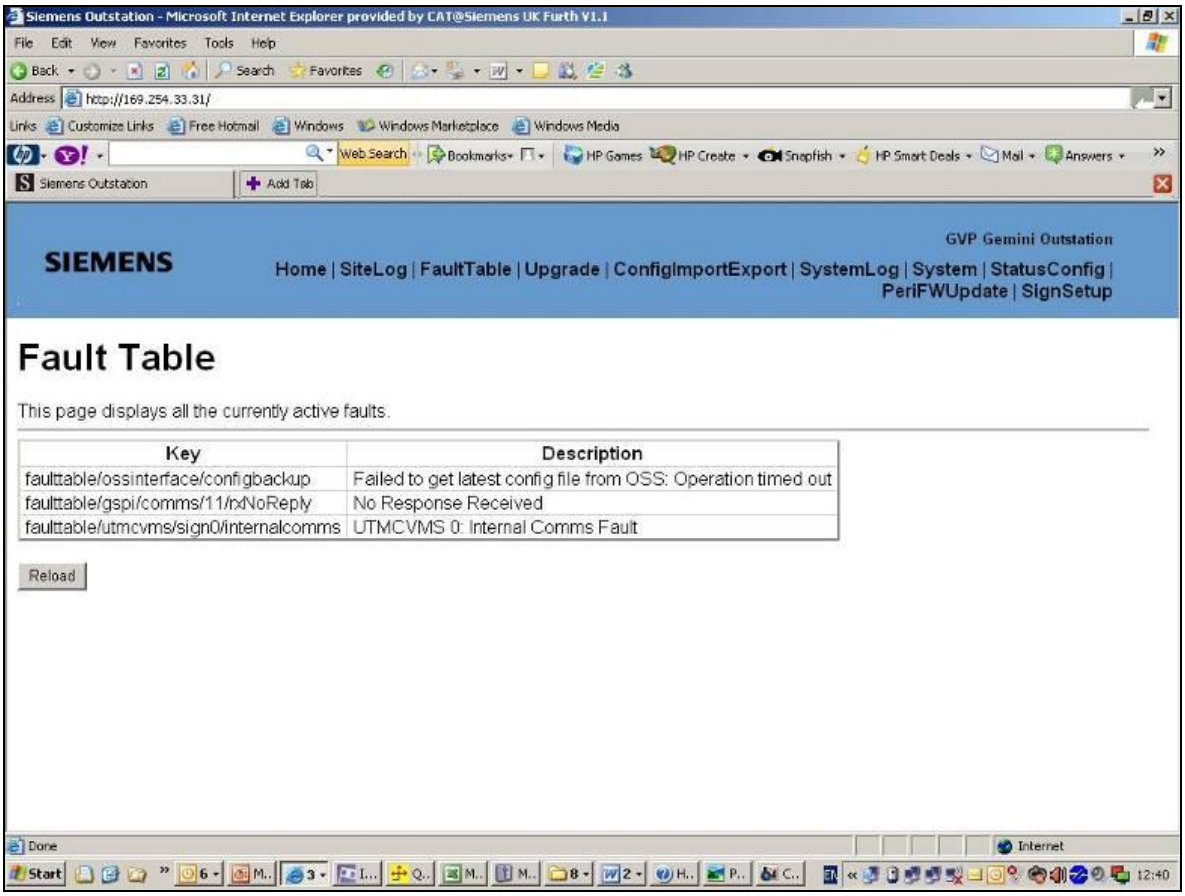


Figure 128 - Communications Failure

12.5.2 Elektra fault Codes

12.5.2.1 Generic IO Application

Key	Description	Further Information
Generic IO/powerFail	Power fail	The application has been informed by the system that the power has failed
uvmsIP/noInstationConnection	Cannot Establish Instation Connection	It has not been possible for the application to connect successfully with the instation
uvmsIP/lossOfCommsToInstation	No comms from instation	The connection with the instation has failed because no messages have been received within the configured timeout
uvmsIP/linkVerifyTimeout	Instation link verify timeout	The connection with the instation has failed because a link verify message has not been received from the instation within the period it specified.

12.5.2.2 UVMS Over IP Application

Key	Description	Further Information
uvmsIP/powerFail	Power fail	The application has been informed by the system that the power has failed
uvmsIP/noInstationConnection	Cannot Establish Instation Connection	It has not been possible for the application to connect successfully with the instation
uvmsIP/lossOfCommsToInstation	No comms from instation	The connection with the instation has failed because no messages have been received within the configured timeout
uvmsIP/linkVerifyTimeout	Instation link verify timeout	The connection with the instation has failed because a link verify message has not been received from the instation within the period it specified.

12.5.2.3 UTMC Application

Key	Description	Further Information
utmcvms/sign/internalcomms	UTMCVMS: Internal Comms Fault	The application has been informed by the system that there has been a communications fault within the system
utmcvms/sign/messagefailed	UTMCVMS: Message failed	The application has been informed by the system that it has not been possible to set the message it requested
utmcvms/sign/ledfail	UTMCVMS: LED Fail	The application has been informed by the system that it has not been possible to set the message it requested
utmcvms/sign/ledfailcritical	UTMCVMS: LED Fail Critical	The application has been informed by the system that there has been a critical LED failure

utmcvms/sign/heaterfail	UTMCVMS: Heater Fail	The application has been informed by the system that there has been a heater failure
utmcvms/sign/watchdogreset	UTMCVMS: Watchdog Reset	The application has been informed by the system that a watchdog reset has occurred
utmcvms/sign/overtemp	UTMCVMS: Over Temperature	The application has been informed by the system that an over temperature fault has occurred
utmcvms/sign/luminancefail	UTMCVMS: Luminance Fail	The application has been informed by the system that the sign luminance is not set correctly
utmcvms/sign/lanternfail	UTMCVMS: Lantern Fail	The application has been informed by the system that a lantern has failed
utmcvms/sign/powerfail	UTMCVMS: Power Fail	The application has been informed by the system that the power has failed

12.5.2.4 Environment Library

Key	Description	Further Information
env/statusMonitorRegistration	Status monitor registration Fault	The library has been unable to register with the GSPI library for status updates
env/noTempSensor	No temperature sensor found	The library has been informed by the system that no temperature sensor has been found
env/noHumSensor	No humidity sensor found	The library has been informed by the system that no humidity sensor has been found
env/noLgtSensor	No light sensor found	The library has been informed by the system that no light sensor has been found
env/gspiInterfaceFlt	GSPI Interface fault	The library has been unable to connect to the GSPI library
env/overTempFlt	Over temperature alarm: nn	The library has detected that the temperature is greater than the maximum configured
env/underTempFlt	Under temperature alarm: nn	The library has detected that the temperature is less than the minimum configured
env/heaterControl/noTempSensor	No temperature sensor found	The heater control has been informed by the system that no temperature sensor has been found
env/heaterControl/noHumSensor	No humidity sensor found	The heater control has been informed by the system that no humidity sensor has been found

nn = measured temperature in deg C

12.5.2.5 UVMS Library

Key	Description	Further Information

uvms/configNotBeingBackedUp	Latest changes to GVP Config not backed up Config Size is nn Failed to compress configuration file Failed to export configuration file	The backup of the configuration data to the sensor board has failed for the reason given
uvms/rowrr/displayBoard	Row rr, Peripheral pp, Pixel Faults on Boards : dd (nn)	Display board dd on display row rr controlled by peripheral with address pp has nn pixel faults
uvms/gspiInterfaceFlt	GSPI Interface fault Unable to open gspiInterface Unable to get gspiInterface	Failed to access the GSPI interface for the reason given
uvms/gspiSignStartupFail	GSPI Sign Startup Sequence failure GSPI Sign Startup Sequence Failed (detecting lanterns) GSPI Sign Startup Sequence Failed (detecting sign size)	Initialisation of the sign failed for the reason given
uvms/lanternllFault	Lantern ll has nn Faults	Lantern ll has nn pixel faults
uvms/lanternAssemblyFault	Lantern assembly la has nn Faults	The lantern assembly la has a total of nn pixel faults
uvms/lanternFault/lluvms/lantern/pair	Lantern Pair Fault str	Pixel faults have exceeded the configured threshold on both lanterns on the pair identified by str
uvms/lantern/single	Single Lantern Fault str	Pixel faults have exceeded the configured threshold on the lanterns identified by str
uvms/lantern/wrongNumber	Wrong number of lanterns fitted Too many lanterns found: nn	The wrong number of lanterns are fitted to the sign
uvms/ledFailCritical	Critical Pixel Fault	The number of pixel faults per character has exceeded the configured threshold for one or more characters within the message displayed on the sign
uvms/ledFailNonCritical	Non Critical Pixel Fault	There are pixel faults on the sign but not such that a critical pixel fault is caused
uvms/lossOfDownwardComms	Loss of comms	GSPI communications has been lost
uvms/messageFail	Failure to set requested message	It has not been possible to set the requested message
uvms/messageFormatFail	Invalid set message received	The requested message is not valid
uvms/controlThreadStartupFail	UVMS Library Control Thread Startup Sequence Failure	The requested message is not valid
uvms/signNotInRunningState	The sign is not in the running state - please see SignSetup	The sign is not in the running state, further information can be found on the SignSetup? Web page
uvms/noChangeInLightReading	No Change in Light Reading	No change in light reading has been detected within the configured period

dd = display board id (first board = 0)

la = lantern assembly id (first assembly = 0)
ll = lantern id (first lantern = 0)
nn = count
pp = peripheral address
rr = display row id (first row = 0)
str = string containing further information regarding the fault

12.5.2.6 GSPI Library

Key	Description	Further Information
gspi/comms/aa/protocolIncompatible	Protocol Incompatible	The GSPI version supported by the sign is not compatible
gspi/comms/aa/rxNoReply	No Response Received	No response received from peripheral
gspi/comms/aa/firmwareChecksum	Firmware Checksum Failed	The peripheral has reported that its firmware checksum check has failed
gspi/comms/aa/gspiAddressChanged	GSPI Address Changed	The peripheral has reported that its address has changed during operation
gspi/comms/aa/configChecksum	Configuration Checksum Failed	The peripheral has reported that its configurationdata checksum has failed
gspi/comms/aa/boardTypeChanged	Board Type Changed	The peripheral has reported that its type has changed during operation
gspi/comms/aa//unrecognisedHardware	Unrecognised Hardware	The peripheral has reported that it does not recognise the hardware
gspi/comms/aa/boardTypeInvalid	Invalid Board Type	The peripheral has reported that the hardware is invalid
gspi/comms/aa/watchdog	Watchdog	The peripheral has reported that its watchdog timeout has expired
gspi/comms/aa/eepromAccess	EEPROM Access Failed	The peripheral has reported that it failed to access its EEPROM correctly
gspi/comms/aa/noGeminiComms	No Comms from Gemini	The peripheral has reported that it has blanked its row due to loss of communications with Gemini
gspi/comms/aa/lightSensorAccess	Light Sensor Access Failed	The sensor has reported that an access to the light sensor has failed
gspi/comms/aa/temperatureOutOfRange	Temperature Reading Out of Range	The sensor has reported that a reading from the temperature sensor was out of range
gspi/comms/aa/humidityOutOfRange	Humidity Reading Out of Range	The sensor has reported that a reading from the humidity sensor was out of range
gspi/comms/aa/lightOutOfRange	Light Reading Out of Range	The sensor has reported that a reading from the light sensor was out of range
gspi/comms/aa/lightSensorScaleChange	Light Sensor Scale Change Failed	The sensor has reported that an attempt to change scale on the light sensor has failed
gspi/comms/aa/noDisplayBoardComms	No Display Board Comms	The row driver has reported that there is a problem with the communications between display boards
gspi/comms/aa/eepromAccess	EEPROM Access Fault : Board D(s) x y z	The row driver has reported that it has not been possible to access the EEPROM on one of the display boards

gspi/comms/aa/eepromChecksum	EEPROM Checksum Failed : Board ID(s) x y z	The row driver has reported that the checksum did not verify on data read from the EEPROM on a display board
gspi/comms/aa/eepromCompatibility	EEPROM Compatibility Fault: Board ID(s) x y z	The row driver has reported that the data contained in the display board EEPROM is not compatible with its firmware
gspi/comms/aa/eepromData	EEPROM Data Out of Range : Board ID(s) x y z	Row driver has reported that the data read from a display board is invalid
gspi/comms/aa/displayBoardsIncompatibile	Incompatible Display Board	The row driver has reported that the display boards to which it is connected are not compatible with each other
gspi/comms/aa/signBlankOverTemperature	Sign Blank due to Over Temperature	The row driver has reported that it has blanked its row due to an over temperature alarm from an LED driver device
gspi/fwdl/gspiInterfaceFlt	GSPI Interface fault No gspiInterface specified Unable to open gspiInterface	It has not been possible to open the GSPI interface

aa = peripheral address
x = display board id (first board = 0)
y = display board id (first board = 0)
z = display board id (first board = 0)

12.5.3 Visual Fault Indicators

The Web interface can be used on site to view the Fault Table and System Log. The table given below indicates the possible diagnosis and action to be taken for other on-site symptoms.

Sympton	Diagnosis	Action
VLED Power LEDs on Display boards not illuminating.	24V Supply absent.	24V Supply absent.
	VLED PSU boards turned off by row drivers. This may be in response to: • A lack of comms with Gemini or Display Boards • LED Over Temperature • Display Board Comms Fault	Check CAT5 cable connections.
	Faulty VLED PSU board	Replace Board
	Faulty Display Board	Replace Board
VLED Power LEDs on Lantern boards not illuminating.	24V Supply absent.	24V Supply absent.
	VLED PSU boards turned off by ROW drivers. This may be in response to: • A lack of comms with Gemini or Display Boards • LED Over Temperature • Display Board Comms Fault	Check CAT5 cable connections.
	Faulty VLED PSU board	Replace Board
	Faulty Display Board	Replace Board
VLED Power LEDs on Lantern boards Flashing	Lantern boards not synchronized – synchronization being attempted.	Check CAT6 cable connections and lantern ESD screws.
COMMS LED on Row Driver or Sensor board not flashing	Addressed but upstream comms subsequently lost.	Check CAT5 cable
Red 'FAULT' LED on Row Driver or Sensor board flashing and 7-Segment display showing two dashes.	No Address allocated	Check CAT5 cable connections.
Red 'FAULT' LED on Row Driver or Sensor board permanently Illuminated	Faulty Row Driver/Sensor Board.	Replace board
Display not 'Dimming' or incorrect brightness.	PWM control of characters not taking place.	Check the current light level using the browser and compare with typical luminance.
Gemini System LED (GREEN) not illuminating	No power or Processor error	Check power to Gemini.
		Change processor board.
Gemini System LED (GREEN) permanently/steadily illuminated	Processor error	Hold down the Processor card Reset button for 2 seconds.
		Power Cycle
		Re-load Firmware
		Change processor board
Gemini System LED (GREEN) Heart Beat. Two flashes in 1 second, then	Main software not executing. Awaiting software update.	

off for 1 second.		
Fading up and down in brightness	Main software not executing. Running 'launcher' program and waiting local software update.	
Gemini Communications LED (GREEN) not illuminating.	No data being received from the network.	Check Modem power and connections. Check state of Modem LED.
Gemini Watchdog LED (RED) permanently illuminated.	The hardware watchdog has timed out sometime in the past. When illuminated, this does not mean that the unit is currently in a watchdog state.	Hold down the Processor card Reset button for 2 seconds.
		Power Cycle
		Re-load Firmware
		Change processor board
Instation indicates that enclosure door permanently open or permanently closed regardless of door position.	Door switch connections incorrect or circuit permanently open/short circuit.	Check door status using Browser.
		Check door switch connections to Gemini PL5.
		Remove connections from PL5 and check resistance.
Heater not functioning.	Heater connections incorrect.	Carry out Heater Test using Browser.
		Check Relay LED is on when heater should be on.
		Check Gemini PL5 output connections
	Gemini not turning on heater, possibly due to sensor board temp or humidity sensor or Gemini/Gemini Config.	Carry out Heater test.
		Replace sensor board.
		Check Gemini Config
		Change Proc board
	Conditions within the enclosure not requiring heater to be activated	No action

Figure 129 – Visual Fault Indicators

12.5.4 Module replacement

12.5.4.1 Replacement: Light sensor

Figure 130 - Replacing the Light Sensor

In order to replace the Light Sensor it will be necessary to access the top of the sign. Ensure that the correct working at height risk assessments and method statements are used.

Disconnect the light sensor lead from the sensor PCB. To test the replacement sensor plug it into the sensor board. Confirm correct operation of the new light sensor with it loosely held before continuing with the replacement. Remove the light sensor and antenna plate from the top of the sign. Unscrew the plastic light sensor nut from the light sensor housing and remove the faulty sensor. Feed the light sensor cable into the sign and replace the module into the plate. Reattach the plate. Note that the light sensor and its plate are areas where water can ingress into the sign. Ensure that the light sensor and its plate are securely fitted and all seals are intact. Feed the light sensor cable through to the sensor board and plug the sensor module into it. Confirm correct operation.

12.5.4.2 Replacement: Modem Antenna

In order to replace the Modem Antenna it will be necessary to access the top of the sign. Ensure that the correct working at height risk assessments and method statements are used.

Remove the antenna cable from the modem on the comms panel and from any clips and cable ties. Remove the light sensor and antenna plate from the top of the sign. Unscrew the antenna and remove it. Feed the antenna cable into the sign and replace the module into the plate. Reattach the plate. Note that the antenna and its plate are areas where water can ingress into the sign. Ensure that they are both securely fitted and all seals are intact. Feed the antenna cable through to the modem and attach the connection. Confirm correct operation.

Figure 131 - Replacing the Modem Antenna

12.5.4.3 Replacement: Sensor Module

Note: copies of the sign configuration are held in the Gemini and sensor module. If both of these are changed at the same time then the configuration will be lost and have to be reloaded e.g. from OSS. To avoid the need to reload the configuration it is recommended that the procedure for replacing one of these items is completed before starting replacement of the other (order does not matter).

Ensure that the sign power is turned off at the Master Switch Assembly. Remove the light sensor connection, the power connection and the RJ45 leads. Remove the screw securing the board to the ESD metal standoff. Carefully ease the board from the plastic standoffs. Fit the new board, remembering to fit the ESD screw and the connectors that were removed.

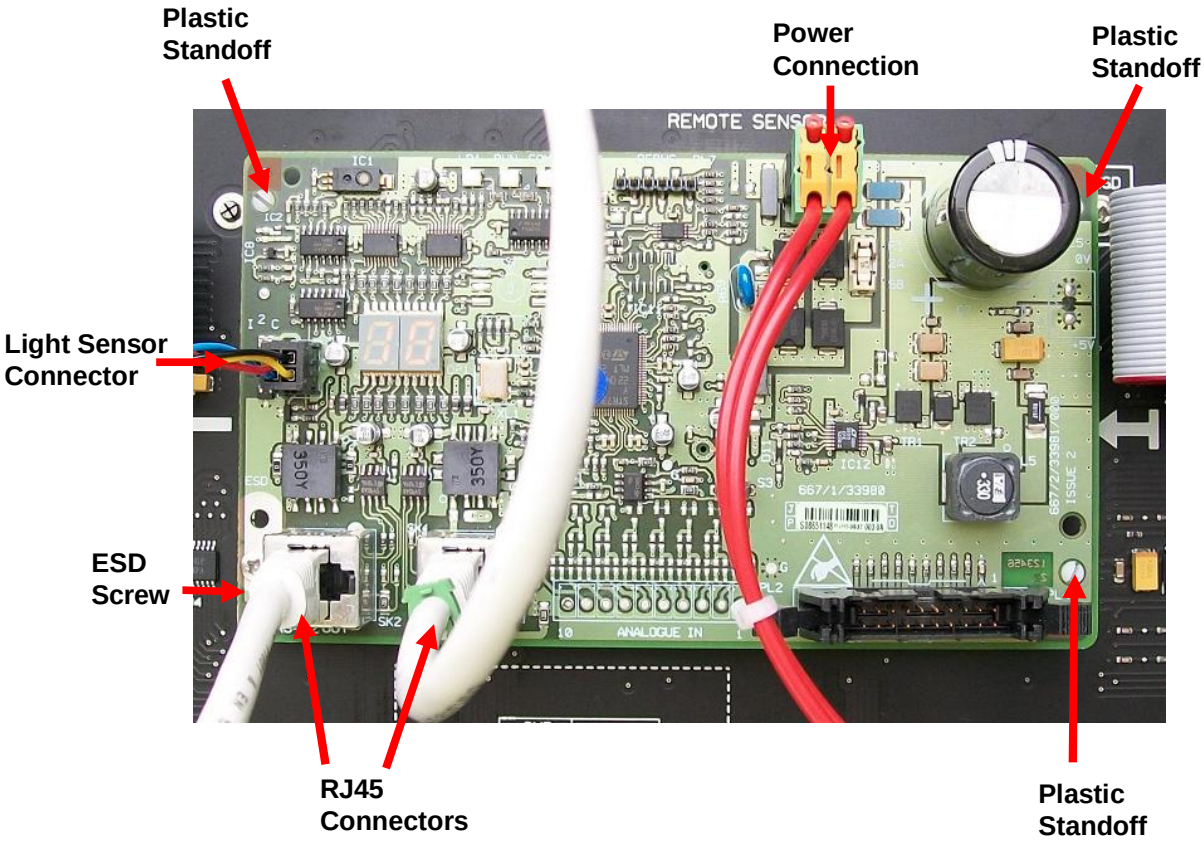


Figure 132 - Replacing the Sensor Module

Replacing the sensor module will lose its copy of the sign configuration. On restart the sign detects and reports this situation on the Sign Setup web page. The action to return the sign to the running state depends on the state reported (which in turn depends on the state of the new sensor module e.g. if it is brand new or previously used in another sign):

- Message: *Stored config and backup config don't match* - press *Save Config to Backup* button
- Message: *No backup config exists* - press *Save Config to Backup* button

The action performed may result in further messages being displayed depending on the state of the sign and the action performed. See section 13.1 for further information on the Sign Setup web page and section 13.1.1 for details on sign states and appropriate action.

12.5.4.4 Replacement: Row Driver Module

Ensure that the sign power is turned off at the Master Switch Assembly. Remove power connection (if fitted) and the RJ45 leads. Remove the screw securing the board to the ESD metal standoff. Carefully ease the board from the plastic standoffs and the connector at the rear, without twisting the board. Fit the new board ensuring that the rear connector is correctly seated and that the board is flat after it has been pressed onto the standoffs. Fit the new board, remembering to fit the ESD screw and the connectors that were removed.

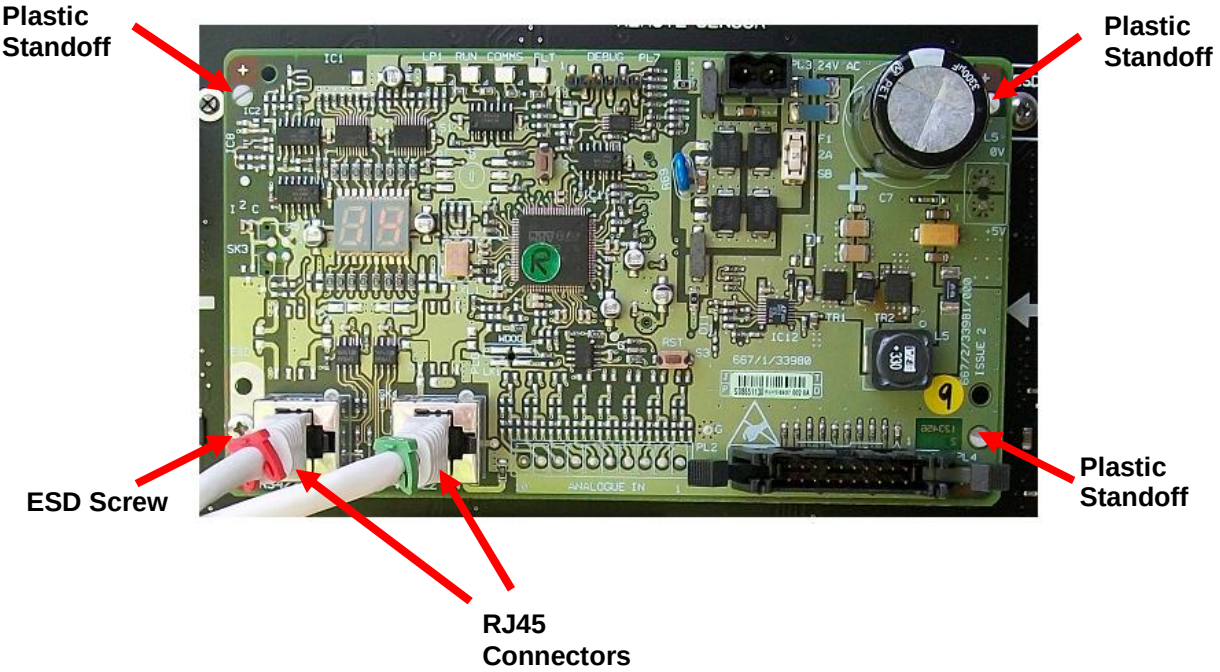


Figure 133 - Replacing the Row Driver Module

12.5.4.5 Replacement: VLED PSU

Ensure that the sign power is turned off at the Master Switch Assembly. Remove the 24V power connection. Remove the screw securing the board to the ESD metal standoff. Carefully ease the board from the plastic standoffs and the connector at the rear, without twisting the board. Fit the new board, remembering to align the connector correctly. Replace the ESD screw and the power connector.

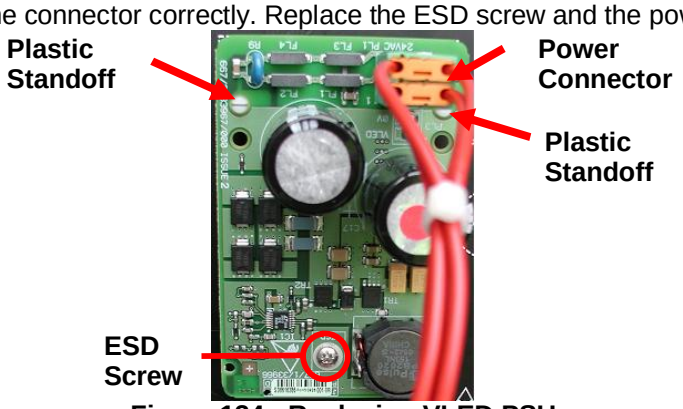


Figure 134 - Replacing VLED PSU

12.5.4.6 Replacement: Display module

Note that, with the exception of the Lanterns, the sunshields should NOT be removed from the sign. To replace a display module it must be removed from the sunshield as described here.

Ensure that the sign power is turned off at the Master Switch Assembly. Remove the Row Driver, Sensor module and VLED PSU from the rear of the display module if they are present. Then remove the ribbon cables. Unscrew the two ESD screws. Remove the board by easing it from the standoffs without twisting it.

To install the new board, locate it on the standoffs and then fit the ESD screws. Replace any other boards that were originally fitted (Row Driver, Sensor or VLED PSU taking care to replace them in the same positions. Finally, reconnect the ribbon cables. A 240 mm display is shown here, however the procedure is essentially the same for the other types of display (not lanterns).

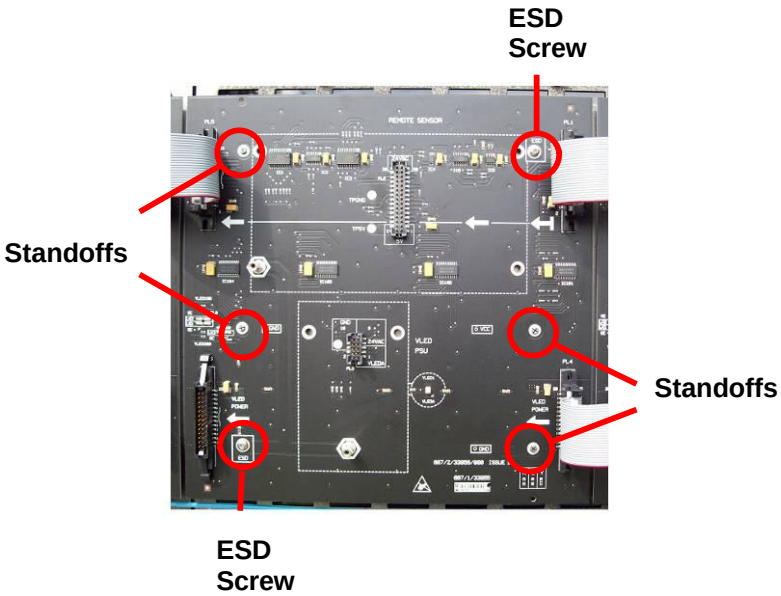


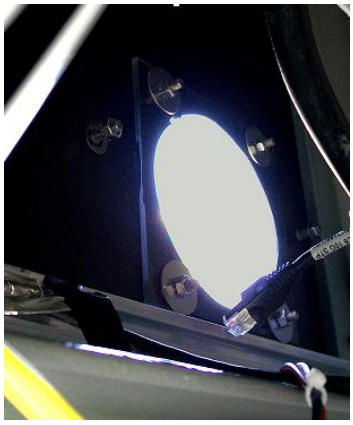
Figure 135 - Replacing Display Modules

12.5.4.7 Replacement: Lantern module

Note: Unlike other display modules, lanterns are removed complete with their sunshield. Do not replace unless you have a spare. Ensure that the sign power is turned off at the Master Switch Assembly. Remove the RJ45 leads, the V_{LED} cables and the 24V power cables (if present). Partially undo the two nuts that hold the lantern to the sign and then slide the lantern until the large washers line up with the enlarged part of the holes in the metalwork. It should then be possible, with care, to withdraw the lantern module.

Once the Lantern module has been removed from the sign, change the Lantern PCB in the same manner described in Section 12.5.4.6 above.

When replacing the lantern module into the sign it should be orientated with the V_{LED} connection towards the bottom of the sign and fitted so that the enlarged parts of the holes in the metalwork fit over the large washers. The lantern should then be slid downwards and the nuts tightened.



Re-fit lantern and then slide down

Figure 136 - Replacing the Lanterns

12.5.4.8 Replacement: Gemini

Note: copies of the sign configuration are held in the Gemini and sensor module. If both of these are changed at the same time then the configuration will be lost and have to be reloaded e.g. from OSS. To avoid the need to reload the configuration it is recommended that the procedure for replacing one of these items is completed before starting replacement of the other (order does not matter).

Disconnect the power from the Gemini using the switch in the Master Switch Assembly. Remove the RJ45 lead from the RS232 to RS422 converter board. Then remove the PL1 connector from the Gemini power supply and remove the earth connection block using a screwdriver. Remove the PL5 connector from the Gemini processor board. Disconnect the Modem ribbon cable from the Gemini processor board. Support the Gemini Unit and unscrew the four screws holding it to the comms module. Remove the Gemini Unit. The Gemini can be placed in a bag and lowered safely to the ground using a lanyard.

Screw the replacement Gemini to the comms module. Fit the RJ45 connector, PL1 connector, earth connector, PL5 connector and Modem Ribbon cable.

Replacing the Gemini will lose its copy of the sign configuration. On restart the sign detects and reports this situation on the Sign Setup web page. The action to return the sign to the running state depends on the state reported (which in turn depends on the state of the new Gemini e.g. if it is brand new or previously used in another sign):

- Message: *Actual sign does not match stored config* – press *Set to Discovered Config* button
- Message: *Stored config and backup config don't match* – press *Load Backup Config* button
- Message: *No stored config exists* – press Load Backup Config button

The action performed may result in further messages being displayed depending on the state of the sign and the action performed. See section 13.1 for further information on the Sign Setup web page and section 13.1.1 for details on sign states and appropriate action.

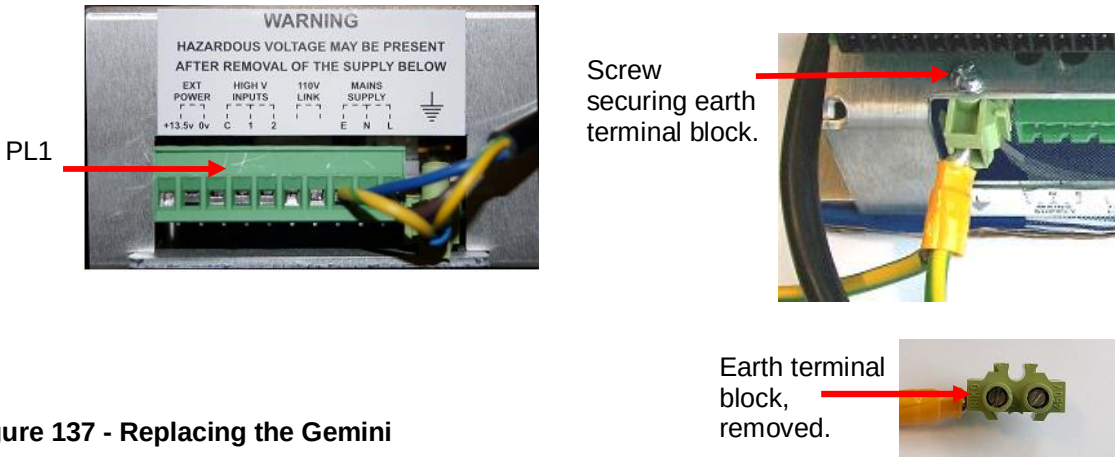


Figure 137 - Replacing the Gemini

12.5.4.9 Replacement: Modem

Disconnect the power from the Gemini using the switch in the Master Switch Assembly. Remove the RJ12, 9 pin D and antenna connectors. Unscrew the 2 screws that hold the modem to the comms panel. Remove the modem. Remove the SIM card and fit it to the replacement unit.
Screw the replacement modem to the comms module. Fit the RJ12, 9 pin D and antenna connectors. Reconnect the power to the Gemini unit.

12.5.4.10 Removal: Comms module

If the comms panel is preventing access to other modules, first try slackening the four nuts identified in Figure 138 and sliding the module sideways. If it is necessary to remove the module, first disconnect the power to the sign using the master switch. Remove the RJ45 lead from the RS232 to RS422 converter board. Remove the antenna/telephone connection from the modem. Remove the PL1 connector from the Gemini power supply and then remove the earth connection block using a screwdriver. Remove the PL5 connector from the Gemini processor board. Before removing the four bolts that secure the Comms module to the sign frame, it may be necessary to support the comms module in some way e.g. a bungee rope. If work is being carried out at height a lanyard should be attached to allow the module to be lowered while maintaining three points of contact. The earth wire can be removed from the earth connection block and the block replaced on the Gemini unit.

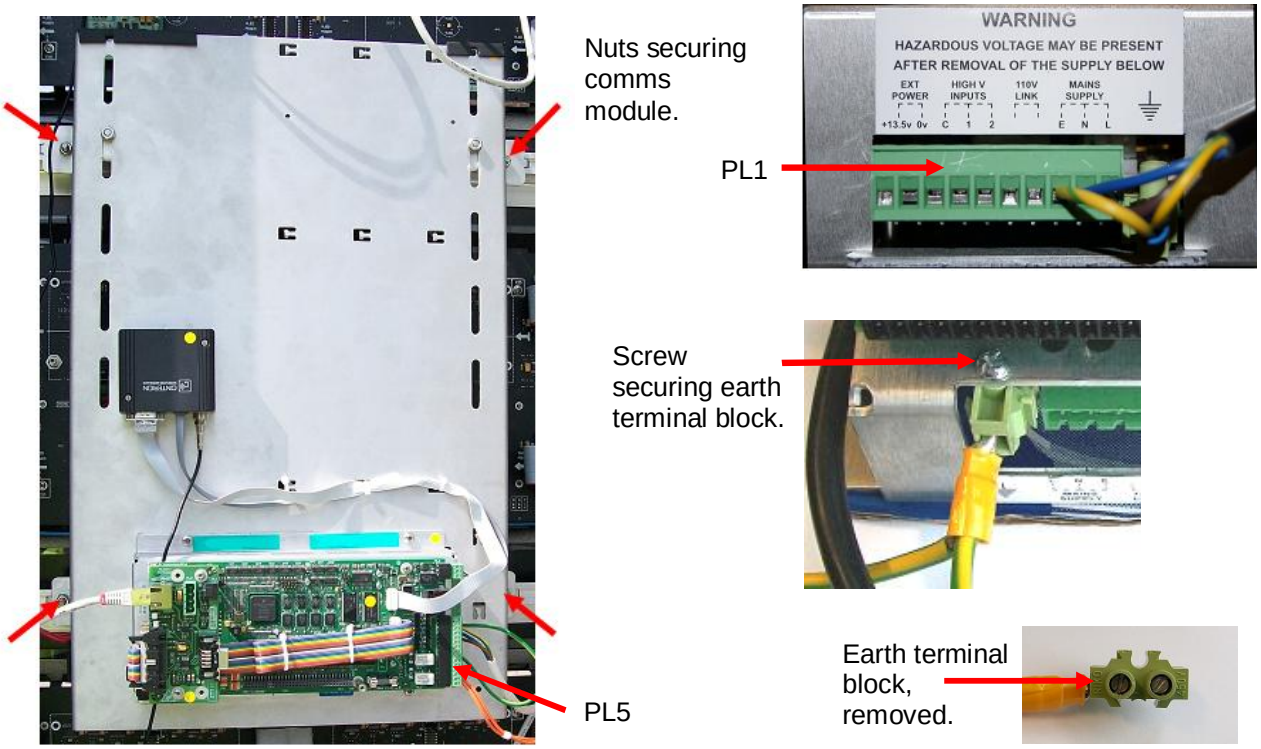


Figure 138 - Replacing the Comms Module

Remove the four nuts and washers that secure the comms module to the sign frame. Remove the comms module and lower it to the ground. To install a new comms module, raise it to the sign using a safe method, locate the four bolts and fit the nuts and washers. Fit PL1 and connect the earth wire. Connect the antenna/telephone connection from the modem and reconnect the RJ45 lead.

IMPORTANT Ensure that the four mounting nuts on the Comms panel are fully tightened at the end of any work on the panel.

12.5.4.11 Replacement; Transformer

The Transformers are very heavy and great care must be exercised when they are replaced. - **Ensure that pedestrians are not endangered at any time.**

- The power should be disconnected using the master switch.
- The tie wraps holding the cables to the transformer which is to be replaced should be carefully cut.
- The mains input connections should be removed and screwed into a spare connection block to make them safe.
- The output connections from the fuse holders and connection blocks should be labelled and then removed.
- The Transformer Mounting Plate should be unbolted from the sign and a lanyard attached to the lifting hole.
- The Transformer complete with Mounting Plate should then be lowered to the ground.

If the replacement Transformer is not complete with Mounting Plate, the Plate must be transferred from the faulty Transformer. The lanyard can then be used to hoist the Replacement Transformer up to the sign enclosure (after appropriate safety precautions have been taken).

The Transformer Mounting Plate should be bolted into the sign and the output cables reconnected.
The Mains cables should then be reconnected and replacement tie wraps fitted.

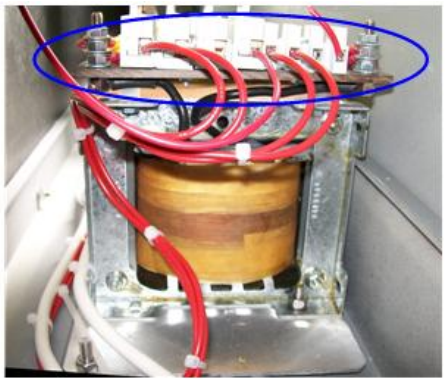


Figure 139 - Replacing Transformers

12.5.4.12 Replacement; SMPS

The PSUs are heavy and great care must be exercised when they are replaced - **Ensure that pedestrians are not endangered at any time.**

- The power should be disconnected using the master switch.
- The tie wraps holding the cables to the PSU which is to be replaced should be carefully cut.
- The mains input connections should be removed and screwed into a spare connection block to make them safe.
- The negative output connections from the PSU and the positive connections from the fuse holders should be labelled and then removed.
- The PSU Mounting Plate should be unbolted from the sign and a lanyard attached to the lifting hole. The PSU complete with Mounting Plate should then be lowered to the ground.
- If the replacement PSU is not complete with Mounting Plate, the Plate must be transferred from the faulty PSU. The lanyard can then be used to hoist the Replacement PSU up to the sign enclosure (after appropriate safety precautions have been taken).
- The PSU Mounting Plate should be bolted into the sign and the output cables reconnected.
- The Mains cables should be reconnected and replacement tie wraps fitted.

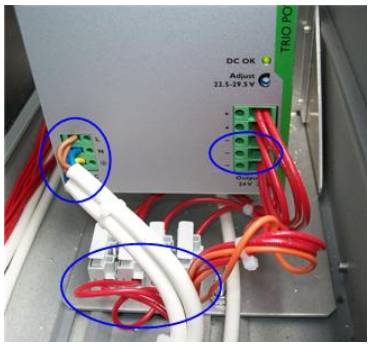


Figure 140 - Replacing SMPS

13 ELEKTRA SPECIFIC STATUS AND CONFIGURATION WEB PAGES

13.1 SIGN SETUP

The Sign Setup web page allows the status and hardware configuration of the sign to be reviewed and some aspects of its operation to be configured. The contents of this web page depend on the status and hardware make up of the sign.

13.1.1 Status

When opened, the sign setup web page (if possible) shows a table identifying the boards found in the sign and the status of the sign. For example:

- Figure 141 shows an example of a sign operating correctly (indicated by the status *Running*)
- Figure 142 shows an example of a sign where the boards have been detected but a configuration problem has been detected (indicated by the status *Actual sign does not match stored config*)
- Figure 143 shows an example of a sign where it has not been possible to detect any boards

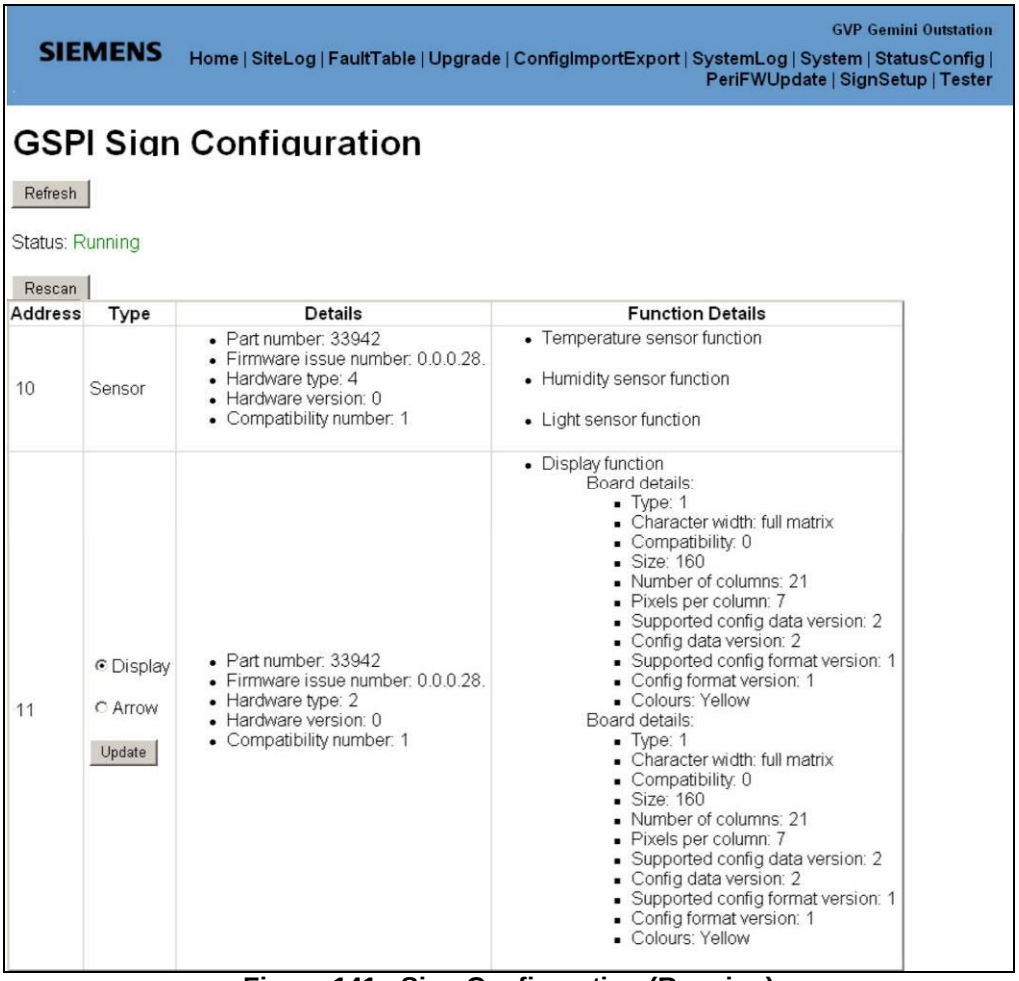


Figure 141 - Sign Configuration (Running)

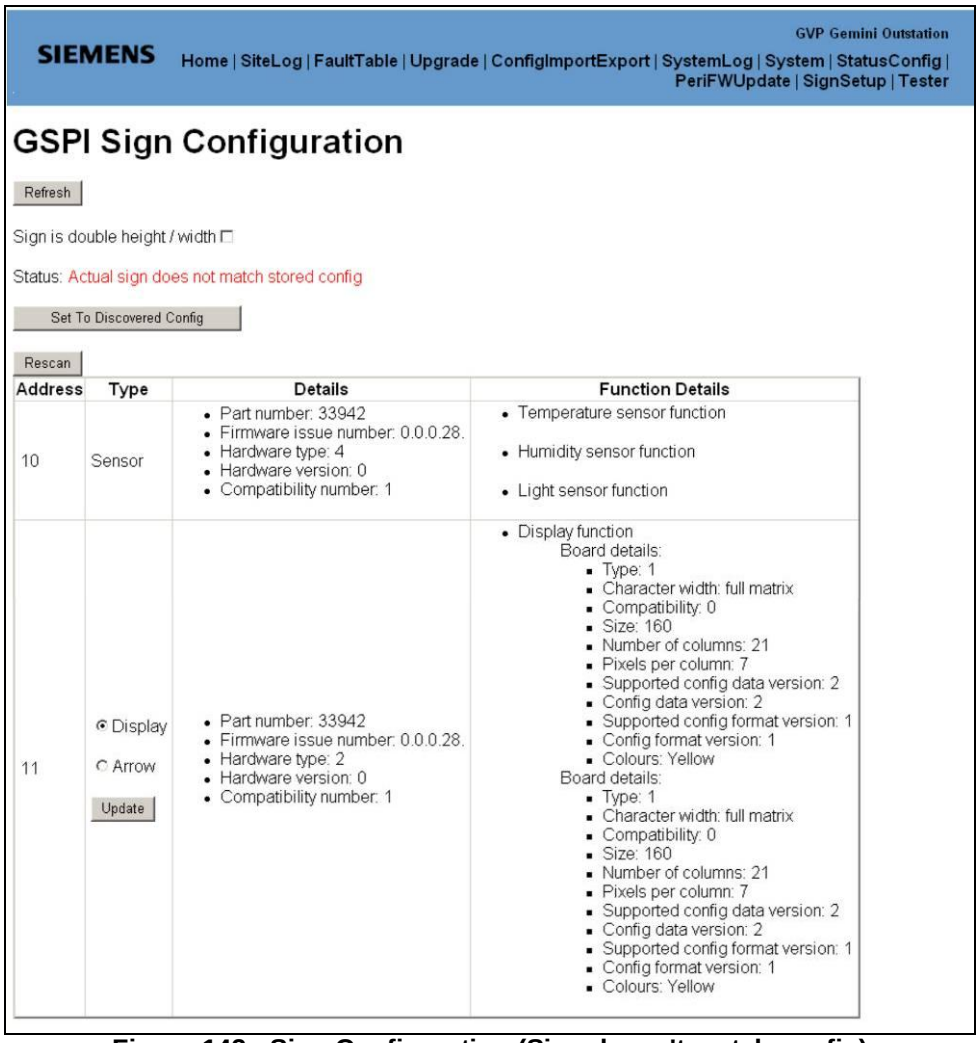


Figure 142 - Sign Configuration (Sign doesn't match config)

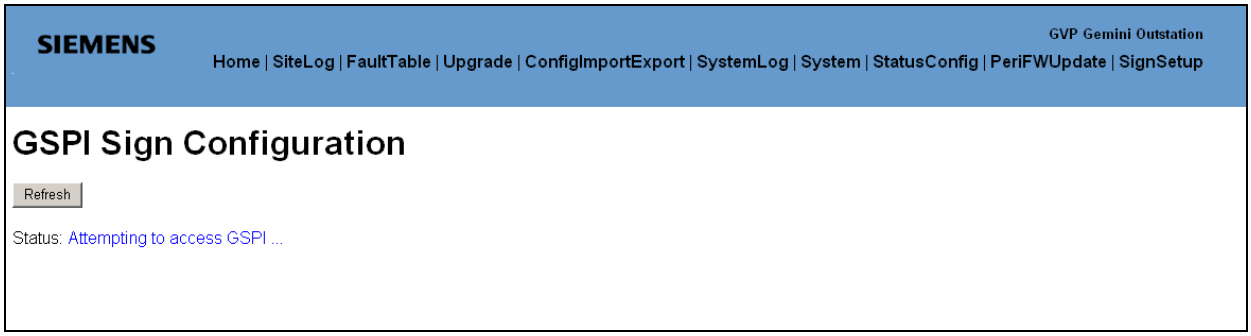


Figure 143 - Sign Configuration (Attempting to access GSPI)

Table 8 lists the status messages which might be displayed. The action performed may result in further messages being displayed depending on the state of the sign and the action performed.

Message	Cause	Action
Working	An operation is in progress	Wait until operation completes
Releasing GSPI	An operation requires exclusive use of the sign e.g. peripheral firmware update	Wait until operation completes
Attempting to access GSPI	The Gemini is attempting to access the boards within the sign	Wait for status to change. If this state persists for too long then investigate the wiring between the Gemini and Sensor board.
Scanning GSPI	The sign is being interrogated to determine boards present	Wait until table of boards appears. If this state persists for too long then investigate the wiring between the Gemini and Sensor board.
Actual sign does not match stored config	The configuration of boards within the sign has been changed	Verify that the configuration displayed is as expected. If it is then press *Set to Discovered Config* button. If it is not then proceed as for *faulty comms*.
	The Gemini has been changed	Verify that the configuration displayed is as expected. If it is then press *Set to Discovered Config* button. If it is not then proceed as for *faulty comms*.
	Faulty comms between boards within the sign	Investigate for faulty cabling between boards or a faulty board. Press *Rescan* button when fault rectified.
Stored config and backup config don't match	The stored config has been updated e.g. through use of *Set to Discovered Config* button.	Press *Save Config To Backup* button.
	The sensor board has been changed	Press *Save Config To Backup* button.
	The Gemini has been changed	Press *Load Backup Config* button or load config using *ConfigImportExport* web page.
	One of the configs has become corrupt.	Verify that the configuration displayed is as expected. If it is then press *Save Config To Backup* button. If it is not then press *Load Backup Config* button.
No backup config exists	The sensor board has been changed	Press *Save Config To Backup* button.
No stored config exists	Initial setup of new sign	Press *Clear Backup Config* button
	The Gemini has been changed	Press *Load Backup Config* button or load config using *ConfigImportExport* web page
Neither stored nor backup configs exist	Initial setup of new sign	Verify that the configuration displayed is as expected. If it is then press *Set to Discovered Config* button. If it is not then proceed as for faulty comms.
Running	Sign is operating correctly	None

Table 8 - Sign Statuses

Depending on the state of the sign, one or more of the following buttons may be available:

Button	Function
Refresh	Refreshes the web page
Rescan	Rescans the sign to determine what boards are present
Set To Discovered Config	Stores the config discovered from the sign into the Gemini
Load Backup Config	Loads the backup config stored on the sensor board into the Gemini
Save Config To Backup	Saves the config stored within the Gemini to the sensor board
Clear Backup Config	Erases the backup config stored on the sensor board

Table 9 - Sign Configuration - available buttons

13.1.2 Hardware Configuration

Whenever possible the Sign Setup webpage lists the peripheral hardware connected to the Gemini to form the sign e.g.Figure 141, Figure 142Figure 142. Each row of the table represents a connected peripheral and each column gives information about the peripherals:

- Address – this is the address of the peripheral as displayed on its seven segment display and reported in the fault table and system log
- Type – this is the type of the peripheral:
    - Sensor – a sensor board peripheral
    - Display – a row-driver peripheral connected to alpha numeric display panels
    - Arrow – a row-driver peripheral connected to a graphical arrow display panel
    - Lantern – a row-driver connected to lantern panels
- Details – this gives further details of the peripheral found:
    - Part number
    - Firmware version number
    - Hardware type:
        - 2 = row-driver
        - 4 = sensor
    - Hardware version number
    - Compatibility number
- Function Details – details of the functions supported by the peripheral.
    - For a sensor this is a list of the sensor supported
    - For a row-driver this is details of the display panels connected:
        - Type:
            - 1 = message
            - 2 = lantern
        - Character type: full matrix or individual character
        - Compatibility
        - Size in mm e.g. 100, 160
        - Number of pixel columns
        - Number of pixels in each column
        - Version of configuration data supported
        - Version of configuration data fitted
        - Format of configuration data supported
        - Format of configuration data fitted
        - Pixel colour(s)

13.1.3 Configuration of Graphical Arrows and 320mm Operation

The following aspects of the operation of the sign are configured through the sign setup web page.

13.1.3.1 Graphical arrows

A display / arrow option is given in the 2nd column for each row in the sign which can be used as a graphical arrow. The correct option should be selected to match the sign.

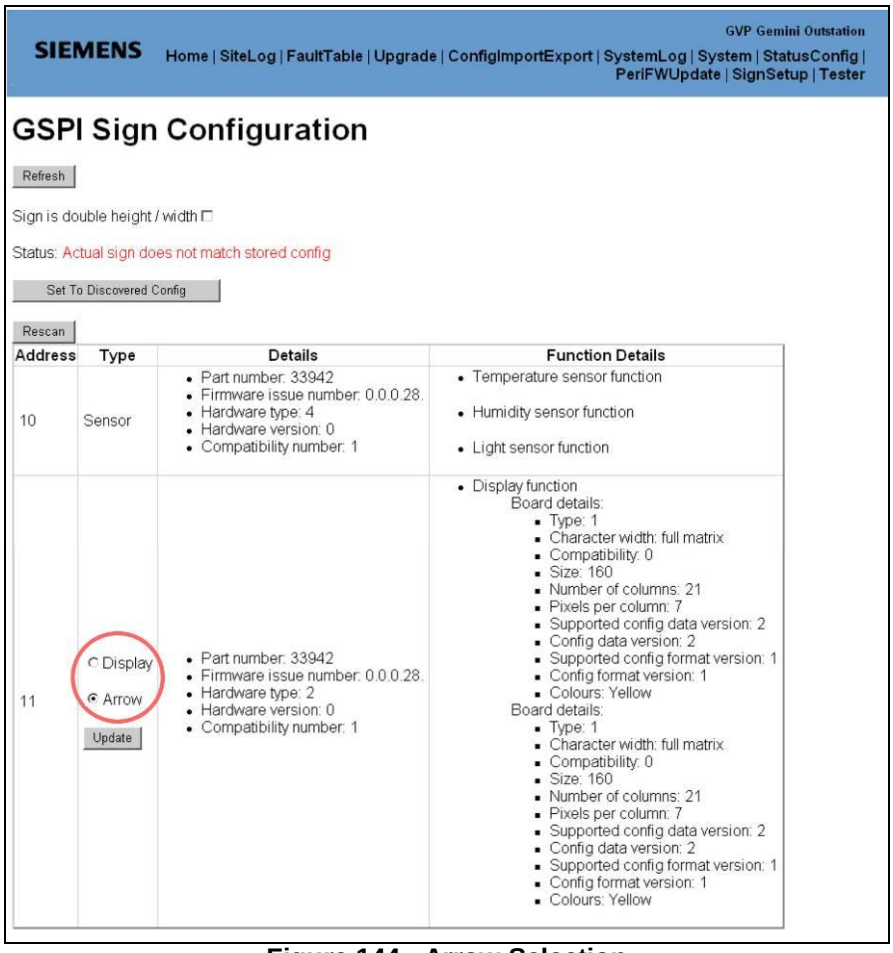


Figure 144 - Arrow Selection

13.1.3.2 320mm operation

This option is displayed on the SignSetup screen if it is possible to use the sign to display 320mm characters. Select this mode of operation if the sign is to be used in this way. The following screen shot shows the tick box used to select 320mm characters (double height/width).

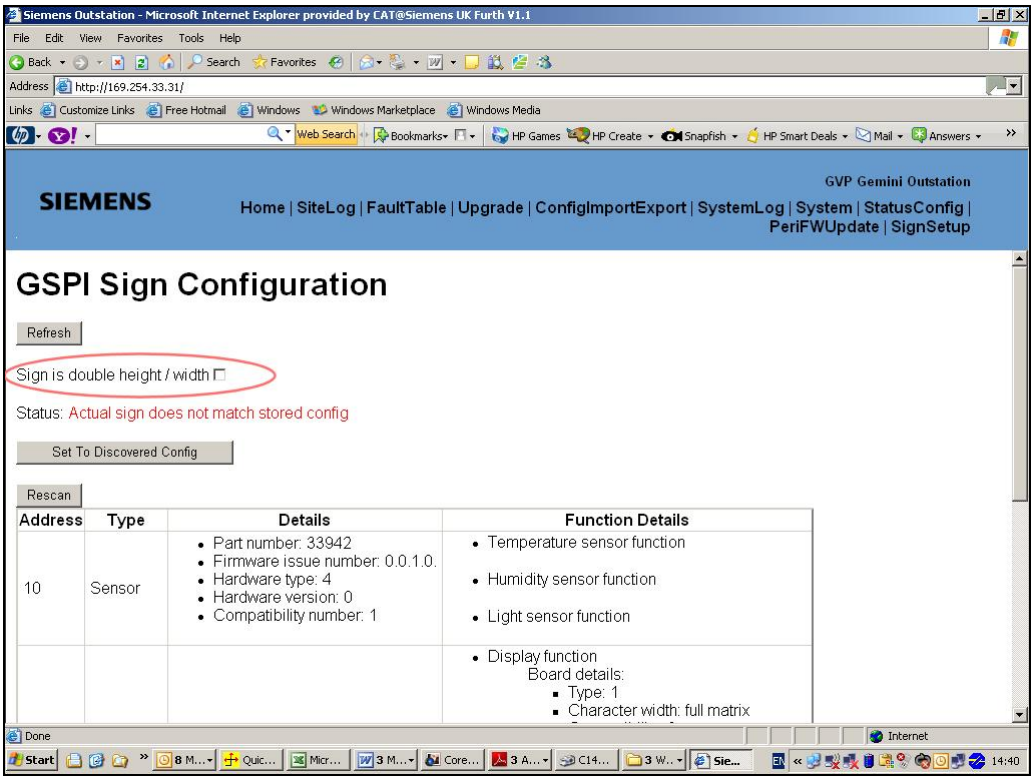


Figure 145 - Configuration of Double Height / Width Operation

The following screen shot shows the screen once double height characters have been selected and the application is running.

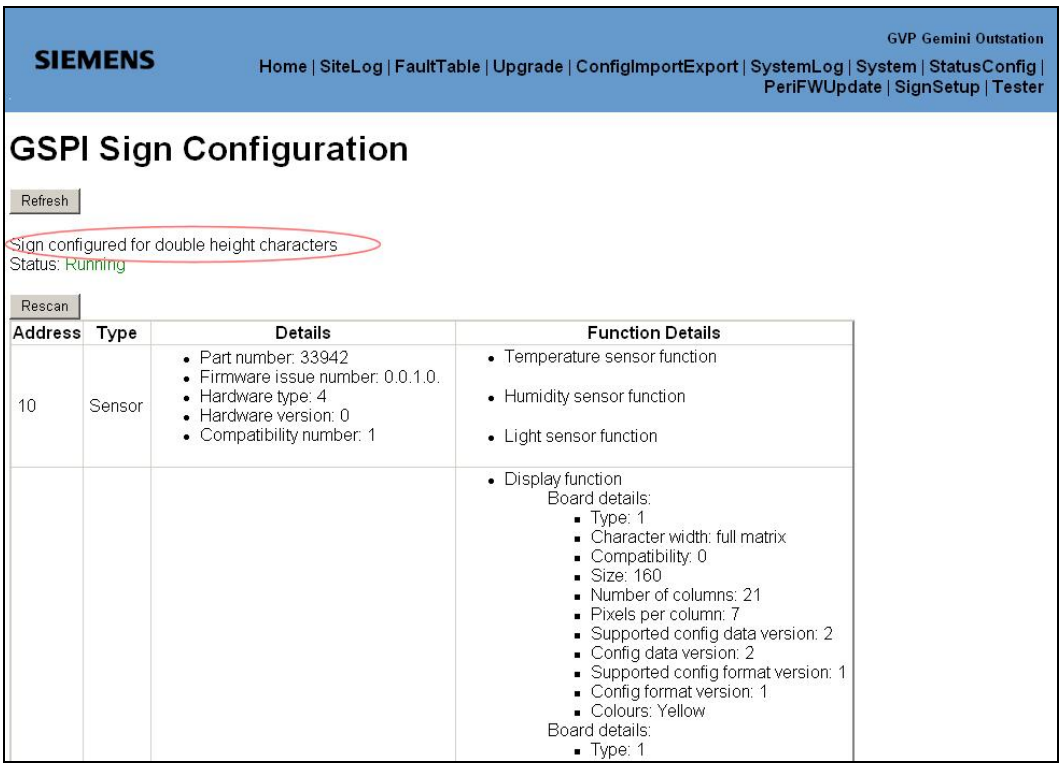


Figure 146 - Verification of Double Height / Width Operation

13.2 PERIPHERAL FIRMWARE UPDATE

Figure 147 - Peripheral Firmware Update

This page allows the firmware within the peripheral devices connected to the Gemini (the sensor and row-drivers) to be updated. This operation should only be performed if the sign is in the *running* state, in which case a screen such as that in Figure 147 will be displayed. The location of the peripheral firmware file on the Gemini filesystem is displayed along with the version of that firmware, in this example:

- etc/peripheralFW.hex
- version 1.0

Note the warning messages on the screen – these should be followed to ensure best performance.

An update is only required if one or more of the peripheral devices contains firmware of a lower version to that listed on this page. The versions of the firmware current contained by the peripherals can be found using the SignSetup web page as described in section 13.1.

If required, click on the *Start* button to initiate the update process. The screen will change to give an indication of progress then return to that shown in Figure 147 when the operation is complete.

If it has not been possible to detect the peripheral cards then the screen shown in Figure 148 is displayed. The cause of this problem should be investigated further by viewing the sign status as described in section 13.1.

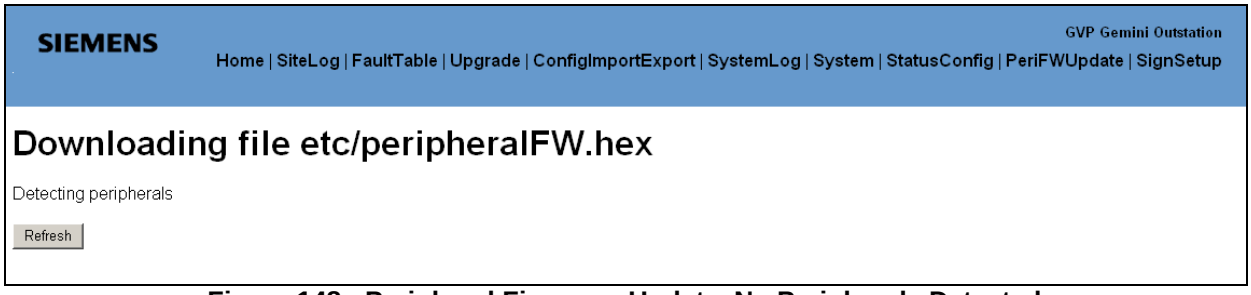


Figure 148 - Peripheral Firmware Update, No Peripherals Detected

13.3 SYSTEM

This screen displays the list of software components running on the outstation. Applications can be started and stopped and the outstation can be re-booted. Please see the GVP Reference Manual (667/HB/31760/000) for detailed information relating to this screen. Screen shots included here merely show the Elektra contents of these pages.

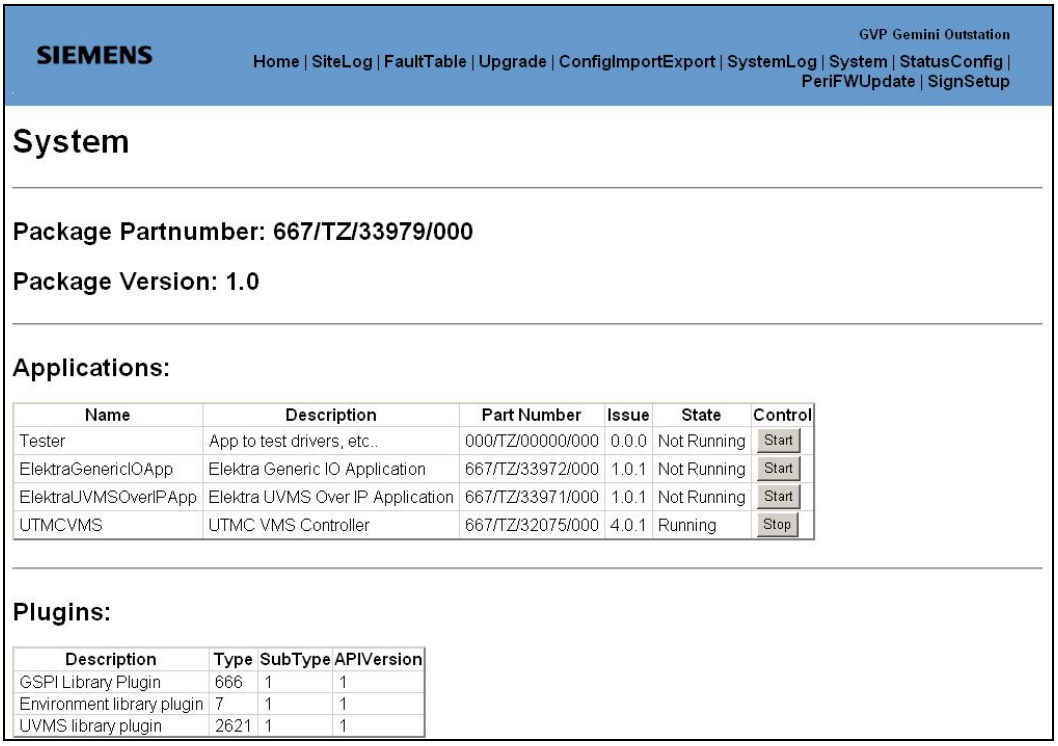


Figure 149 - System (Part 1)

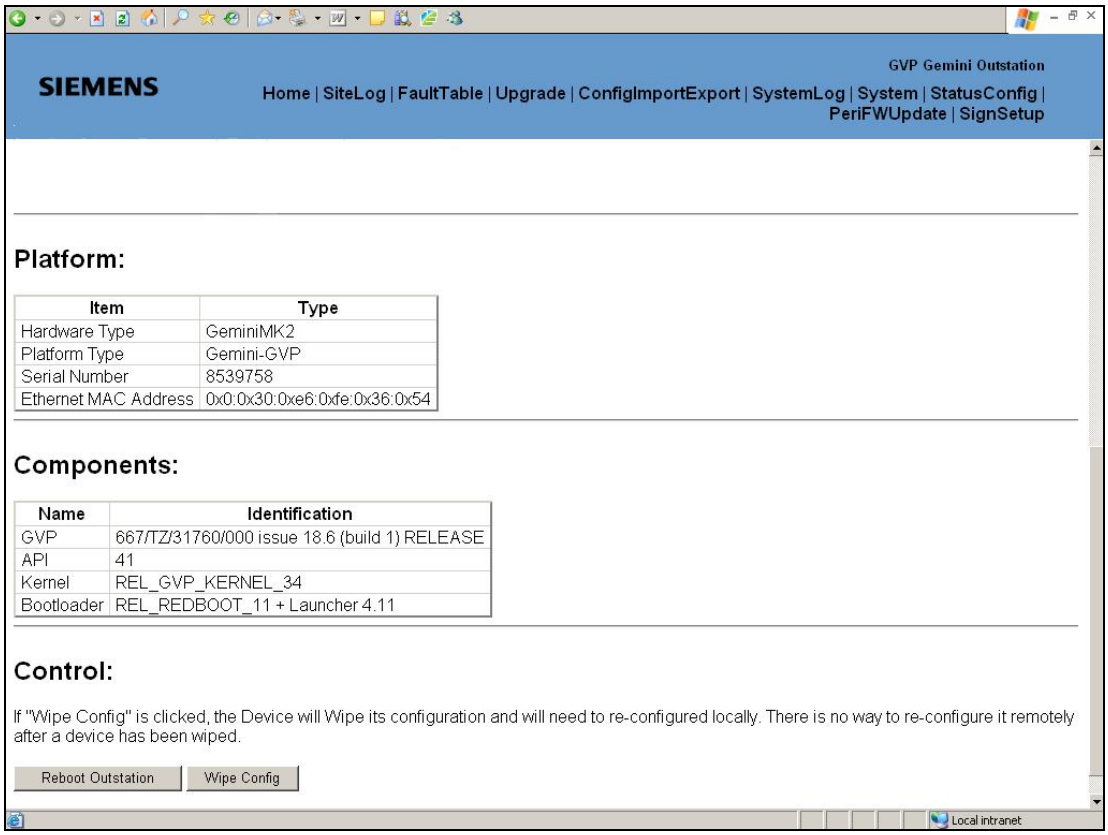
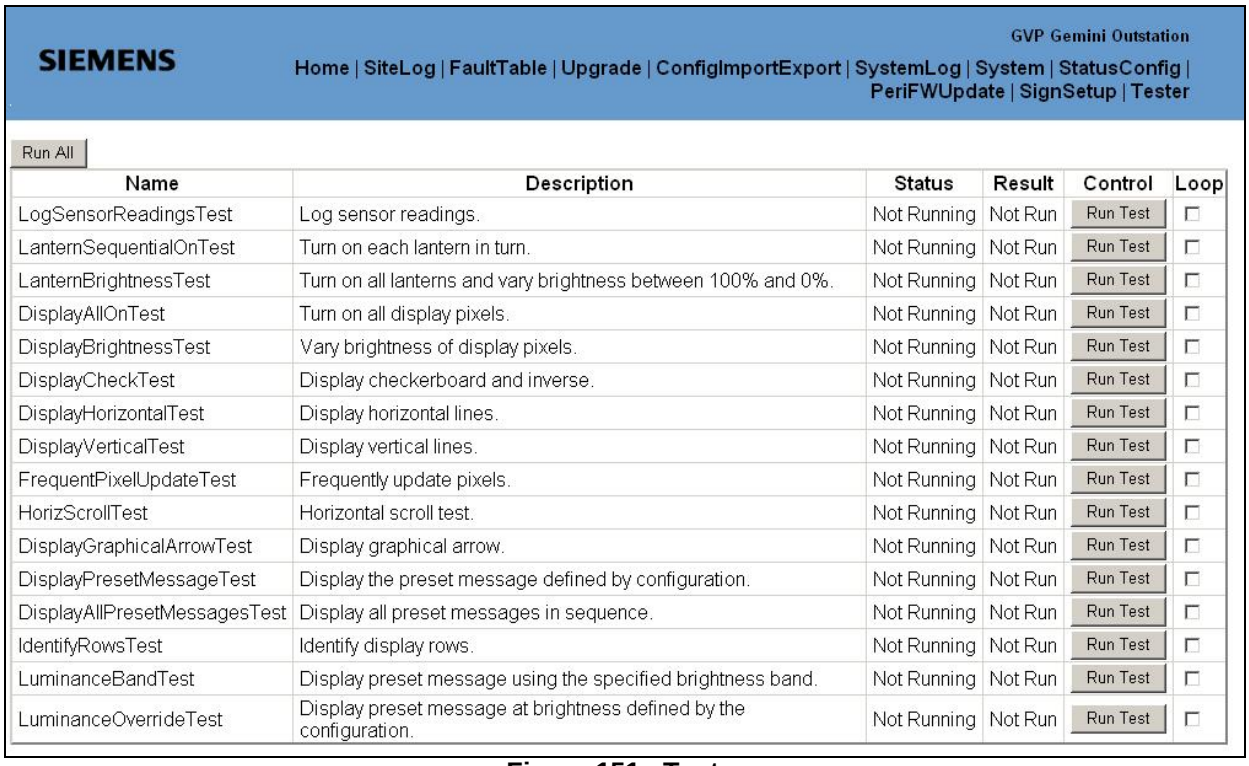


Figure 150 - System (Part 2)

13.4 TESTER

The tester application can be used to run various tests which can be seen in the screenshot below. Tests are started by clicking the ‘run test’ button. If it is required that the test runs in a constant loop, the loop box should be ticked.



Name	Description	Status	Result	Control	Loop
LogSensorReadingsTest	Log sensor readings.	Not Running	Not Run	Run Test	☐
LanternSequentialOnTest	Turn on each lantern in turn.	Not Running	Not Run	Run Test	☐
LanternBrightnessTest	Turn on all lanterns and vary brightness between 100% and 0%.	Not Running	Not Run	Run Test	☐
DisplayAllOnTest	Turn on all display pixels.	Not Running	Not Run	Run Test	☐
DisplayBrightnessTest	Vary brightness of display pixels.	Not Running	Not Run	Run Test	☐
DisplayCheckTest	Display checkerboard and inverse.	Not Running	Not Run	Run Test	☐
DisplayHorizontalTest	Display horizontal lines.	Not Running	Not Run	Run Test	☐
DisplayVerticalTest	Display vertical lines.	Not Running	Not Run	Run Test	☐
FrequentPixelUpdateTest	Frequently update pixels.	Not Running	Not Run	Run Test	☐
HorizScrollTest	Horizontal scroll test.	Not Running	Not Run	Run Test	☐
DisplayGraphicalArrowTest	Display graphical arrow.	Not Running	Not Run	Run Test	☐
DisplayPresetMessageTest	Display the preset message defined by configuration.	Not Running	Not Run	Run Test	☐
DisplayAllPresetMessagesTest	Display all preset messages in sequence.	Not Running	Not Run	Run Test	☐
IdentifyRowsTest	Identify display rows.	Not Running	Not Run	Run Test	☐
LuminanceBandTest	Display preset message using the specified brightness band.	Not Running	Not Run	Run Test	☐
LuminanceOverrideTest	Display preset message at brightness defined by the configuration.	Not Running	Not Run	Run Test	☐

Figure 151 - Tester

The operations performed by each test are as follows:

- LogSensorReadingsTest: Periodically writes the values obtained from the fitted sensors to the System Log. This test can be used to verify that the sensors are operating.
- LanternSequenceOnTest: Illuminates each lantern in turn in the order specified on the Lantern Position configuration screen (section 13.11.3). This test can be used to verify that the lantern cabling and position configuration are as expected.
- LanternBrightnessTest: Cycles the brightness of the lanterns between maximum and zero brightness. This test can be used to verify that PWM brightness control of the lanterns is working correctly.
- DisplayAllOnTest: Turns on all of each colour display pixels (not lanterns) in turn. This test can be used to verify that pixels can be turned on.
- DisplayCheckTest: Displays a checkerboard pattern and its inverse for each colour in turn.
- DisplayHorizontalTest: Displays horizontal lines for each colour in turn.
- DisplayVerticalTest: Displays vertical lines for each colour in turn.
- FrequentPixelUpdateTest: Displays animated spinners. This test produces a significant load on the internal communications and so can be used to test for problems in this area.
- HorizScrollTest: Displays a horizontally scrolling bar. This test produces a significant load on the internal communications and so can be used to test for problems in this area.
- DisplayGraphicalArrowTest: Cycles through the eight graphical arrow images.
- DisplayPresetMessageTest: Displays the preset message defined by the configuration (section 13.9.6)
- DisplayAllPresetMessagesTest: Cycles through all defined preset messages until an empty message is found. This test can be used to verify the display of configured preset messages.
- IdentifyRowsTest: Displays the row number of each row on the row itself. This can be used to verify row connection and identity.
- LuminanceBandTest: Displays a preset message as per DisplayPresetMessageTest but forces the sign brightness to the band specified.
- LuminanceOverrideTest: Displays a preset message as per DisplayPresetMessageTest but forces the sign brightness to the PWM level specified.

Various characteristics of the tests can be configured as described in section 13.9.

13.5 STATUSCONFIG COMMON WEB INTERFACE SCREENS

This section describes the common StatusConfig web interface screens provided by the GVP platform. Wherever possible reference is made to the GVP Reference Manual (667/HB/31760/000) but where information is not yet available in that document, it is contained here. It is envisaged that future issues of the GVP Reference Manual will contain this information and allow it to be removed and referenced from this section.

13.5.1 SITE LOG SCREEN

Refer to Section on 'Site Log Screen' in GVP Reference Manual 667/HB/31760/000

13.5.2 SYSTEM LOG SCREEN

Refer to Section on 'System Log Screen' in GVP Reference Manual 667/HB/31760/000

13.5.3 GPRS Screen

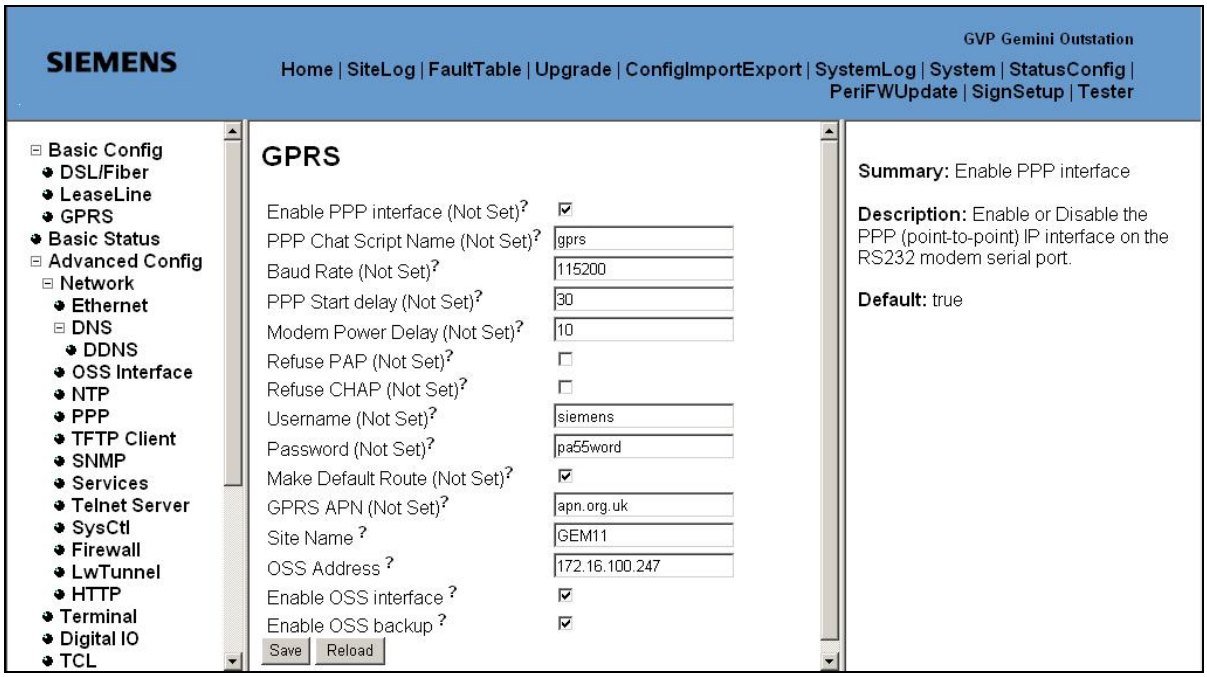


Figure 152 - GPRS

Enable PPP interface
Enable or Disable the PPP (point-to-point) IP interface on the RS232 modem serial port.

PPP Chat Script Name
Configure the name of the chat script used to configure the modem before PPP is started. Possible values are gprs, nullmodem, winserver

Baud Rate
This option defines the RS232 BAUD rate that will be used beteen the serial port and the Modem. Possible values are 9600, 19200, 38400, 57600, 115200

PPP Start delay
Configure the delay (in seconds) between modem power on and PPP starting. This is used to give the GPRS/other modem chance to connect upstream.

Modem Power Delay
Configure the delay (in seconds) to keep the modem power off.

Refuse PAP
With this option, pppd will not agree to authenticate itself to the peer using PAP.

Refuse CHAP
With this option, pppd will not agree to authenticate itself to the peer using CHAP.

Username
Username to use for authentication.

Password
Configure the password used if PAP or CHAP authentication is required

Make Default Route
With this option, pppd will make the PPP interface the default IP route for IP traffic.

GPRS APN
Define the APN if using the GPRS connection script.

Site Name
Configure the site name for this Gemini unit.

OSS Address
Configure the IP address for the Outstation Support Server

Enable OSS interface
Enable or Disable the Outstation Support Server interface.

Enable OSS backup
Enable or Disable the backup of config to the Outstation Support Server.

13.5.4 Basic Status Screen

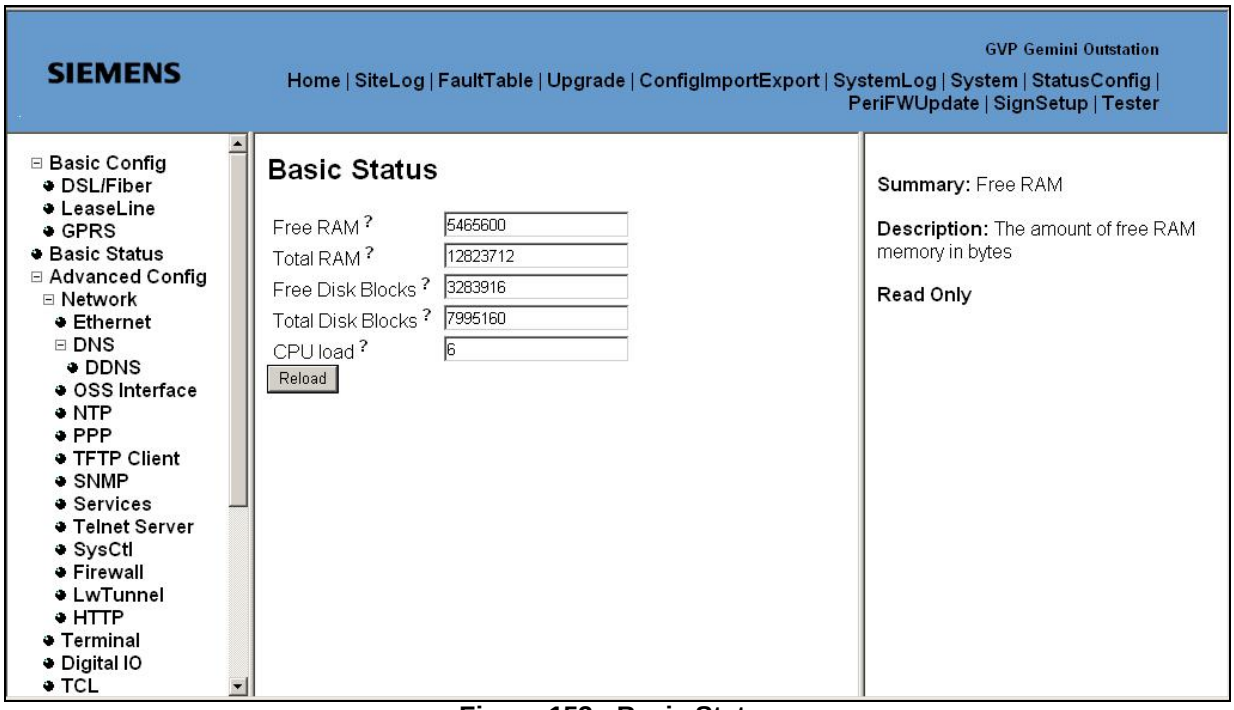


Figure 153 - Basic Status

Free RAM
The amount of free RAM memory in bytes

Total RAM
The amount of RAM memory in Bytes

Free Disk Blocks
The amount of free Disk blocks

Total Disk Blocks
The total amount of Disk blocks

CPU load
The percentage of CPU used.

13.5.5 Ethernet Screen

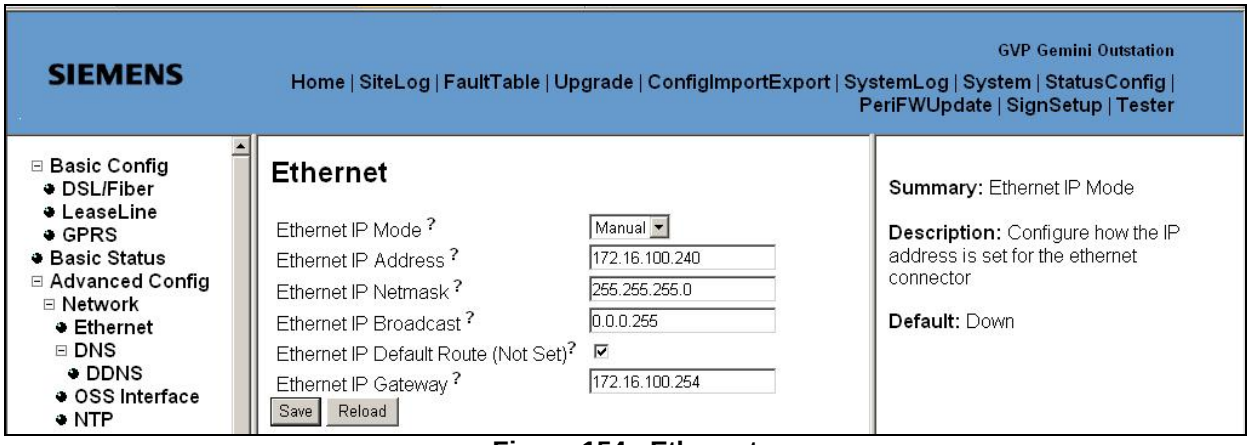


Figure 154 - Ethernet

Ethernet IP Mode
Configure how the IP address is set for the ethernet connector

Ethernet IP Address
Configure how the IP address is set for the ethernet connector

Ethernet IP Netmask
Configure the netmask that should be used for the Ethenet network.

Ethernet IP Broadcast
Configure the broadcast address that should be used for the Ethenet network.

Ethernet IP Default Route (Not Set)
Configure the Ethernet Interface to be the Default Route for IP data.

Ethernet IP Gateway
Configure the gateway address that should be used for the Ethenet network.

13.5.6 DNS Screen

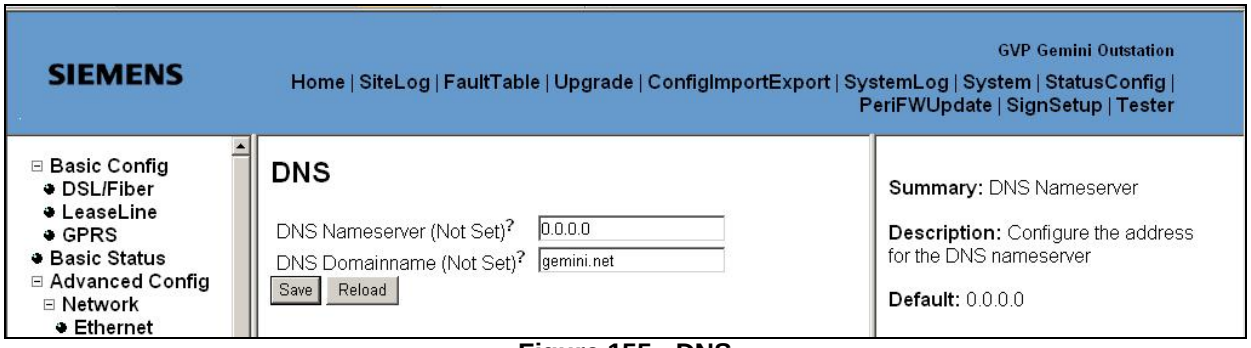


Figure 155 - DNS

DNS Nameserver
Description: Configure the address for the DNS nameserver.
Default: 0.0.0.0

DNS Domainname
Description: Configure the domain name for the DNS.
Default: gemini.net

13.5.7 DDNS Screen

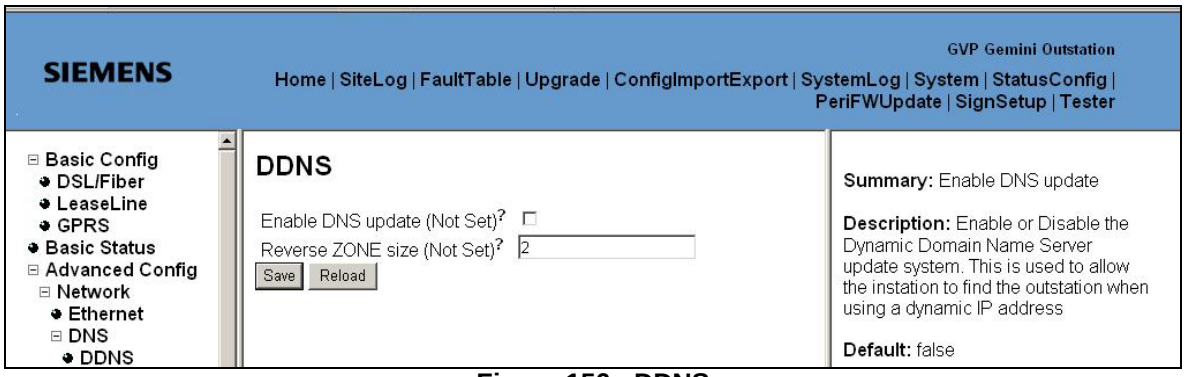


Figure 156 - DDNS

Enable DNS update
Description: Enable or Disable the Dynamic Domain Name Server update system. This is used to allow the instation to find the outstation when using a dynamic IP address.
Default: false

Reverse ZONE size
Description: Define the size of the reverse DNS zone size. This must match the zone defined at the DNS server. For example, for the reverse zone 100.16.172.in-addr.arpa, a value of 3 is needed, for 172.in-addr.arpa a value of 1 is needed.
Default: 2

13.5.8 OSS Screen

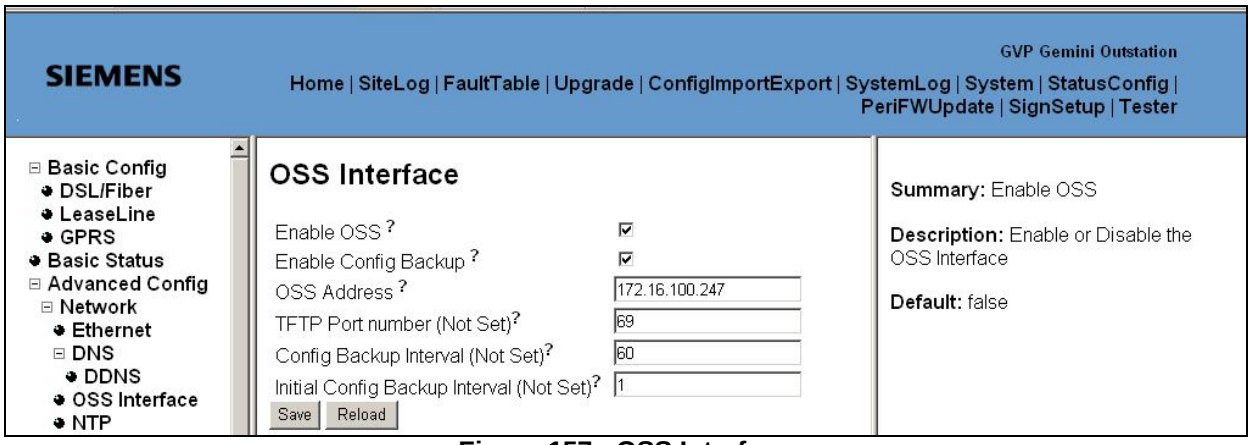


Figure 157 - OSS Interface

Enable OSS
Description: Enable or Disable the OSS Interface.
Default: false

Enable Config Backup
Description: Enable or Disable the automatic backup of config to the OSS.
Default: false

OSS Address.
Description: Configure the IP address for the Outstation Support Server.
Default: 10.10.10.10

TFTP Port number.
Description: Define the port number of the OSS file transfer.
Default: 69

Config Backup Interval.
Description: Number of minutes between backups to OSS.
Default: 60

Initial Config Backup Interval.
Description: Number of initial minutes before performing the first backup to OSS.
Default: 1

13.5.9 PPP Screen

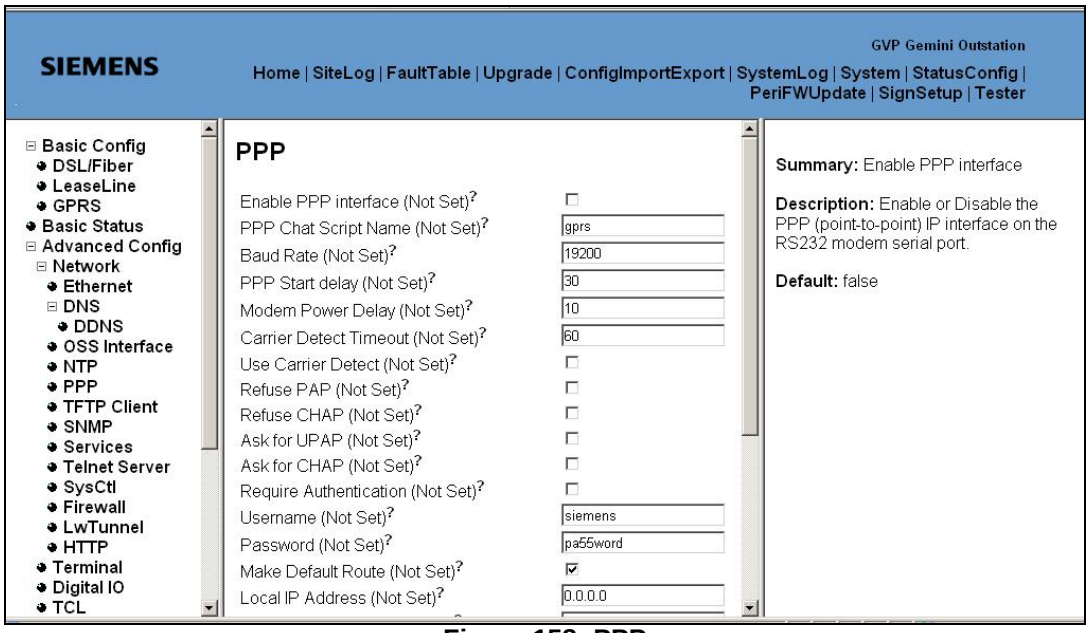


Figure 158 -PPP

Enable PPP interface
Description: Enable or Disable the PPP (point-to-point) IP interface on the RS232 modem serial port.
Default: false

PPP Chat Script Name
Description: Configure the name of the chat script used to configure the modem before PPP is started. Possible values are gprs, nullmodem, winserver.
Default: gprs.

Baud Rate
Description: This option defines the RS232 BAUD rate that will be used beteen the serial port and the Modem. Possible values are 9600, 19200, 38400, 57600, 115200.
Default: 19200.

PPP Start delay
Description: Configure the delay (in seconds) between modem power on and PPP starting. This is used to give the GPRS/other modem chance to connect upstream.
Default: 30.

Modem Power Delay
Description: Configure the delay (in seconds) to keep the modem power off.
Default: 10.

Carrier Detect Timeout
Description: Configure the delay (in seconds) to wait before giving up on Carrier Detect and restarting. This option is only used if the Use Carrier Detect option is enabled.
Default: 60.

Use Carrier Detect
Description: With this option, pppd will wait for the carrier detect to be active before starting PPP.
Default: false

Refuse PAP
Description: With this option, pppd will not agree to authenticate itself to the peer using PAP.
Default: false.

Refuse CHAP
Description: With this option, pppd will not agree to authenticate itself to the peer using CHAP.
Default: false

Ask for UPAP
Description: Ask the peer to authenticate itself using PAP [Password Authentication Protocol] authentication.
Default: false.

Ask for CHAP
Description: Ask the peer to authenticate itself using CHAP [Challenge Handshake Authentication Protocol] authentication.
Default: false.

Require Authentication
Description: With this option, pppd will not bring the PPP link up unless the peer authenticates itself.
Default: false.

Username
Description: Username to use for authentication.
Default:.

Password
Description: Configure the password used if PAP or CHAP authentication is required.
Default:

Make Default Route
Description: With this option, pppd will make the PPP interface the default IP route for IP traffic.
Default: true

Local IP Address
Description: Configure the IP address of the modem PPP interface. If the IP address is set to 0.0.0.0, then the peer will be expected to provide a valid IP address.
Default: 0.0.0.0

Remote IP Address
Description: Configure the IP address of the remote peer. The remote address will be obtained from the peer if not specified in any option (by settings to 0.0.0.0. Thus, in simple cases, this option is not required.
Default: 0.0.0.0

PPP Interface Netmask
Description: Configure the netmask address for the PPP interface. If the IP address is set to 0.0.0.0, then the peer will be expected to provide a vaild IP address.
Default: 0.0.0.0

Idle Time Limit
Description: Configure the delay (in seconds) to keep PPP active without traffic. If no IP traffic is received for this length of time, the PPP link is dropped. Setting to 0 will disable.
Default: 0

LCP Echo Failures
Description: pppd will presume the peer to be dead if n LCP echo-requests are sent without receiving a valid LCP echo-reply. If this happens, pppd will terminate the connection. Use of this option requires a

non-zero value for the LCP Echo Interval parameter. This option can be used to enable pppd to terminate after the physical connection has been broken (e.g., the modem has hung up).
Default: 10

LCP Echo Interval
Description: pppd will send an LCP echo-request frame to the peer every n seconds. Normally the peer should respond to the echo-request by sending an echo-reply. This option can be used with the LCP Echo Failures option to detect that the peer is no longer connected.
Default: 10

Disable Van Jacobson Compression
Description: Disable Van Jacobson style TCP/IP header compression in both the transmit and the receive direction.
Default: true

Max Connection Time
Description: Terminate the connection when it has been available for network traffic for n seconds (i.e. n seconds after the first network control protocol comes up). 0 to disable.
Default: 0

GPRS APN
Description: Define the APN if using the GPRS connection script.
Default: apn.org.uk

13.5.10 TFTP Screen

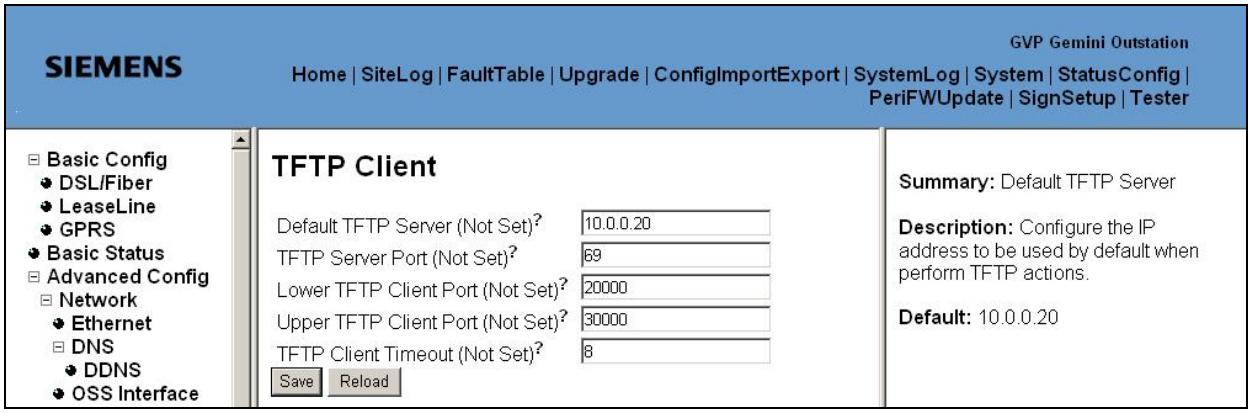


Figure 159 - TFTP

Default TFTP Server
Description: Configure the IP address to be used by default when perform TFTP actions.
Default: 10.0.0.20

TFTP Server Port
Description: Configure the IP port to use on the TFTP server.
Default: 69

Lower TFTP Client Port
Description: Configure the lower local IP port to use.
Default: 20000

Upper TFTP Client Port
Description: Configure the upper local IP port to use.
Default: 30000

TFTP Client Timeout
Description: Configure the number of seconds before a TFTP download/upload timeout.
Default: 8

13.5.11 SNMP Screen

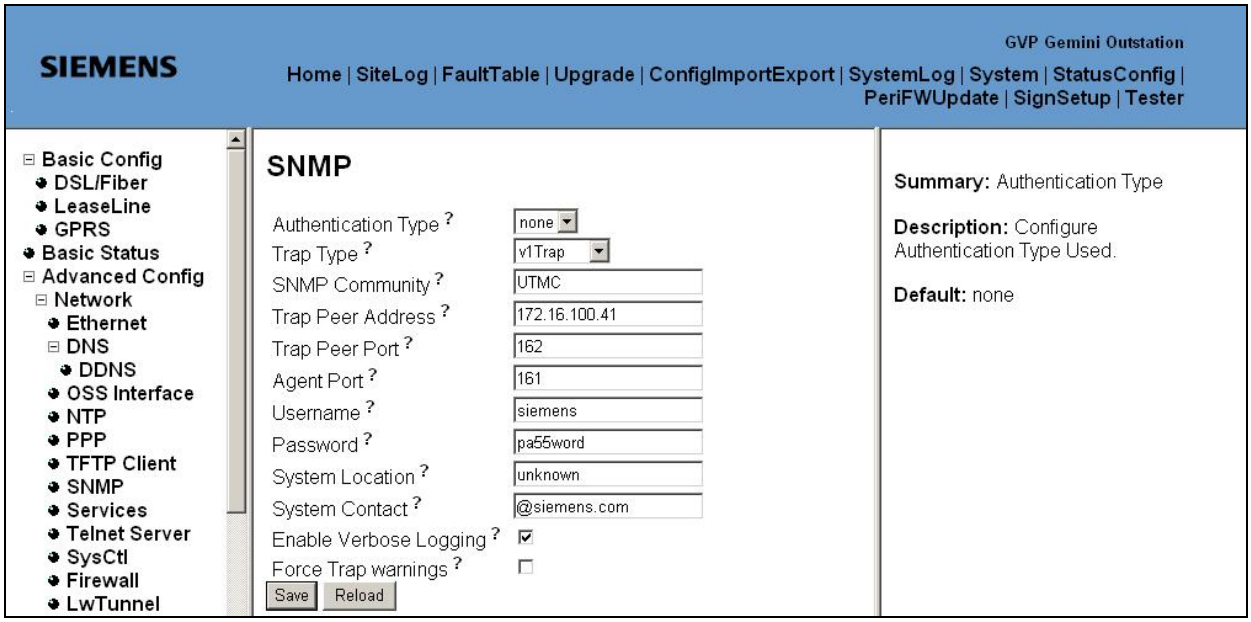


Figure 160 - SNMP

Authentication Type
Description: Configure Authentication Type Used.
Default: none

Trap Type
Description: Configure Trap Type Used.
Default: v1Trap

SNMP Community
Description: Configure the community string used for SNMP V1 and V2c.
Default: public

Trap Peer Address
Description: Configure the IP address that SNMP TRAPs and INFORMS are sent to.
Default: 10.0.0.10

Trap Peer Port
Description: Configure the IP port that SNMP TRAPs and INFORMS are sent to on the peer.
Default: 162

Agent Port
Description: Configure the IP port that the local SNMP agent will use for incomming SNMP get and set requests.
Default: 161

Username
Description: Configure the username required for SNMP v3 authentication.
Default:

Password
Description: Configure the password required for SNMP v3 authentication. NOTE this needs to be a minimum of size of 8.
Default:

System Location
Description: Configure the System location field presented via the SNMP system MIB.
Default: unknown

System Contact
Description: Configure the System contact field presented via the SNMP system MIB.
Default: unknown

Enable Verbose Logging
Description: Configure the SNMP agent to produce more Verbose debug logs.
Default: false

Force Trap warnings
Description: Configure the SNMP agent to report trap sending errors as warning, this reduces the amount of messages in the system log when it is expected to get problems sending traps.
Default: false

13.5.12 Services Screen

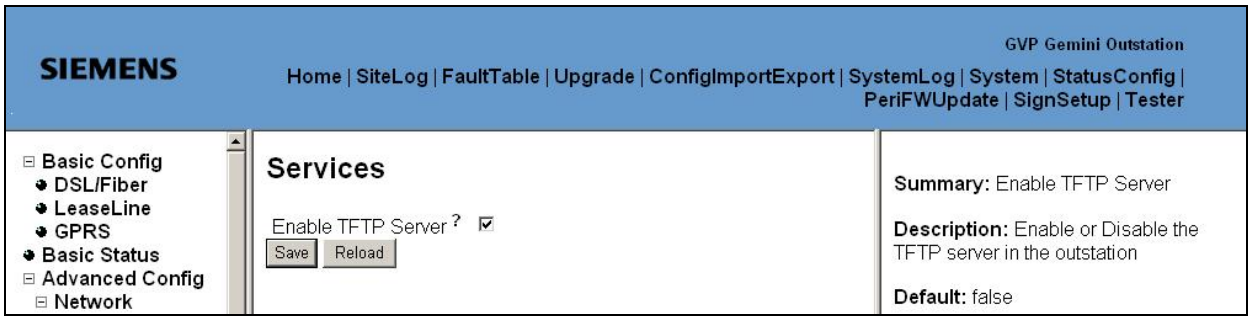


Figure 161 - Services

Enable TFTP Server
Description: Enable or Disable the TFTP server in the outstation.
Default: false

13.5.13 Telnet Server Screen

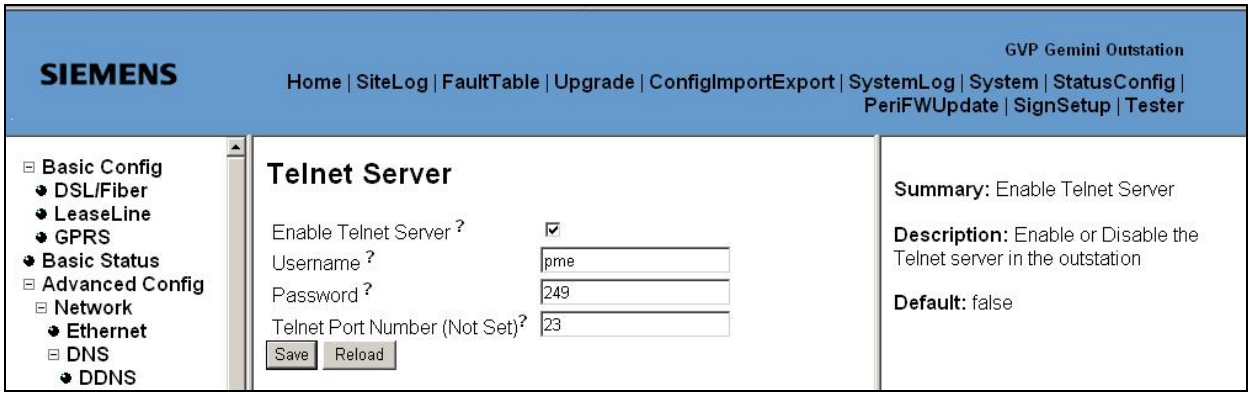


Figure 162 - Telnet Server

Enable Telnet Server
Description: Enable or Disable the Telnet server in the outstation.
Default: false

Username
Description: Configure the username for Telnet.
Default:

Password
Description: Configure the password for Telnet
Default:

Telnet Port Number
Description: Configure the port number for the telnet server to use.
Default: 23

13.5.14 SysCtl Screen

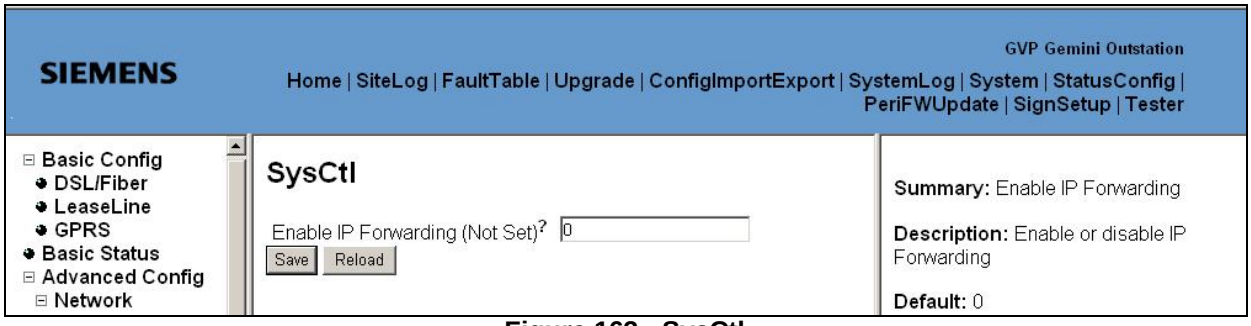


Figure 163 - SysCtl

Enable IP Forwarding
Description: Enable or disable IP Forwarding.
Default: 0

13.5.15 Firewall Screen

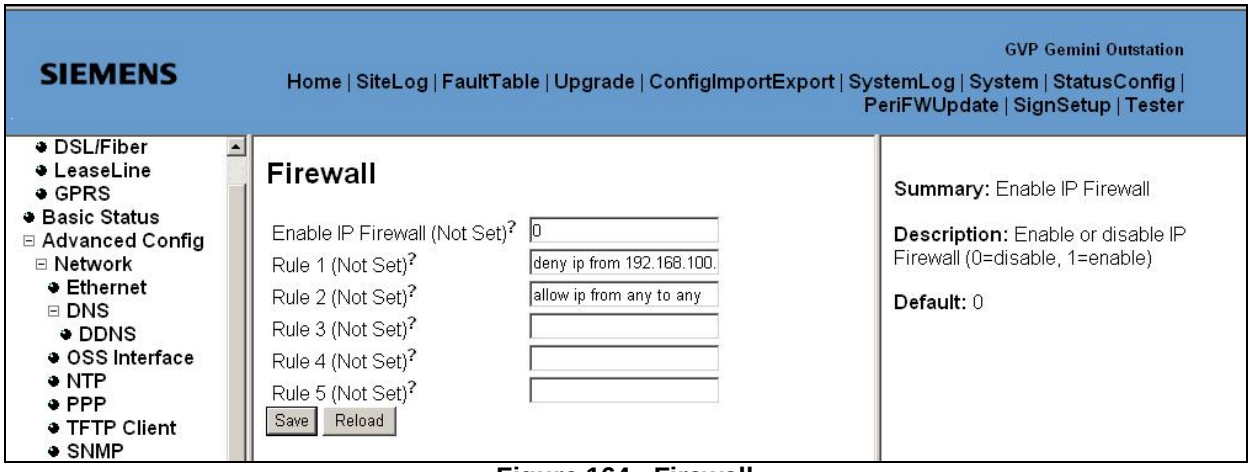


Figure 164 - Firewall

Enable IP Firewall
Description: Enable or disable IP Firewall (0=disable, 1=enable).
Default: 0

Rule 1
Description: Enter the IP Firewall rule. See man ipfw for more information.
Default: deny ip from 192.168.100.0/24 to me

Rule 2
Description: Enter the IP Firewall rule. See man ipfw for more information.
Default: allow ip from any to any

13.5.16 Light Weight Tunnel Screen

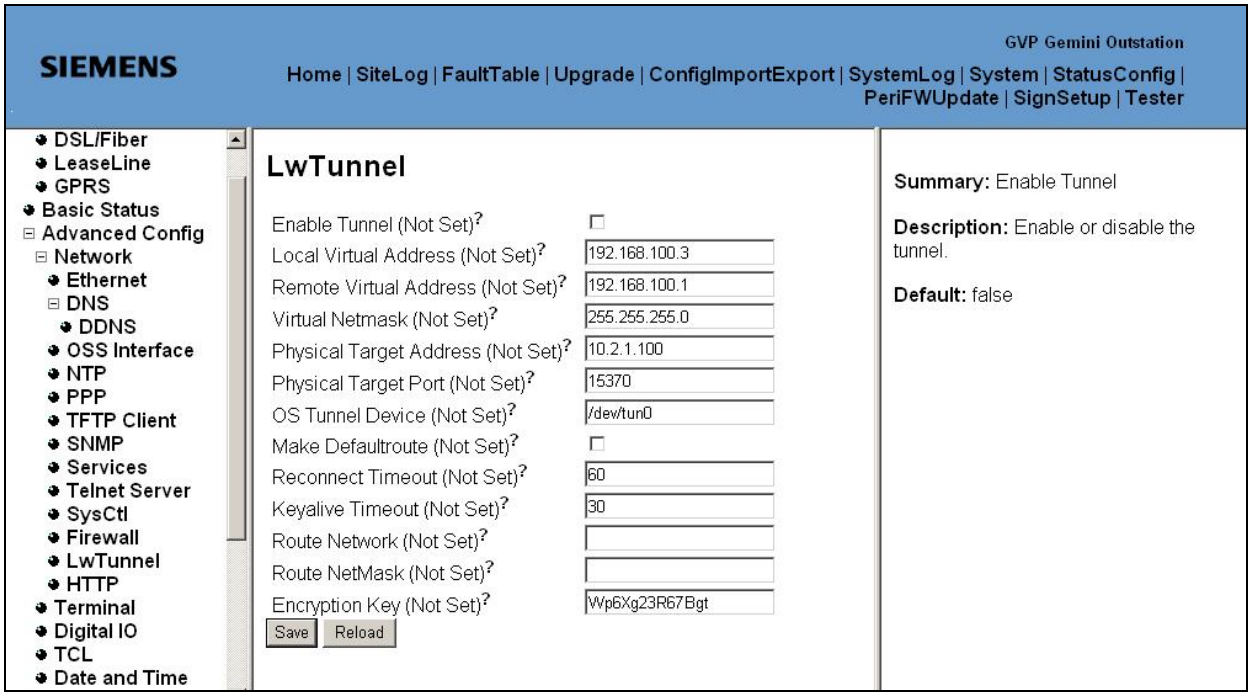


Figure 165 - LwTunnel

Enable Tunnel
Description: Enable or disable the tunnel.
Default: false

Local Virtual Address
Description: Configure the local Virtual IP Address.
Default: 192.168.100.3

Remote Virtual Address
Description: Configure the remote Virtual IP Address. This is only needed for the client (outstation) end.
Default: 192.168.100.1

Virtual Netmask
Description: Configure the Virtual Netmask Address.
Default: 255.255.255.0

Physical Target Address
Description: Configure the Real world Tunnel target IP address.
Default: 10.2.1.100

Physical Target Port
Description: Configure the Real world Tunnel target IP port number.
Default: 15370

OS Tunnel Device
Description: Configure the Tunnel device name. For example /dev/tun0.
Default: /dev/tun0

Make Defaultroute
Description: Configure the tunnel interface as a default route for IP packets.
Default: false

Reconnect Timeout
Description: Configure the time (in seconds) after a disconnect before a client will try to re-connect to the tunnel server.
Default: 60

Keyalive Timeout
Description: Configure the time (in minutes) that the client will resend a keep alive message. This message is used to keep the tcl connection active.
Default: 30

Route Network
Description: Configure a custom route for routing IP packets to the Peer.
Default:

Route NetMask
Description: Configure a custom route mask, this goes with the Route Network option.
Default:

Encryption Key
Description: Configure the Tunnel shared secret key.
Default: Wp6Xg23R67Bgt

13.5.17 HTTP Screen

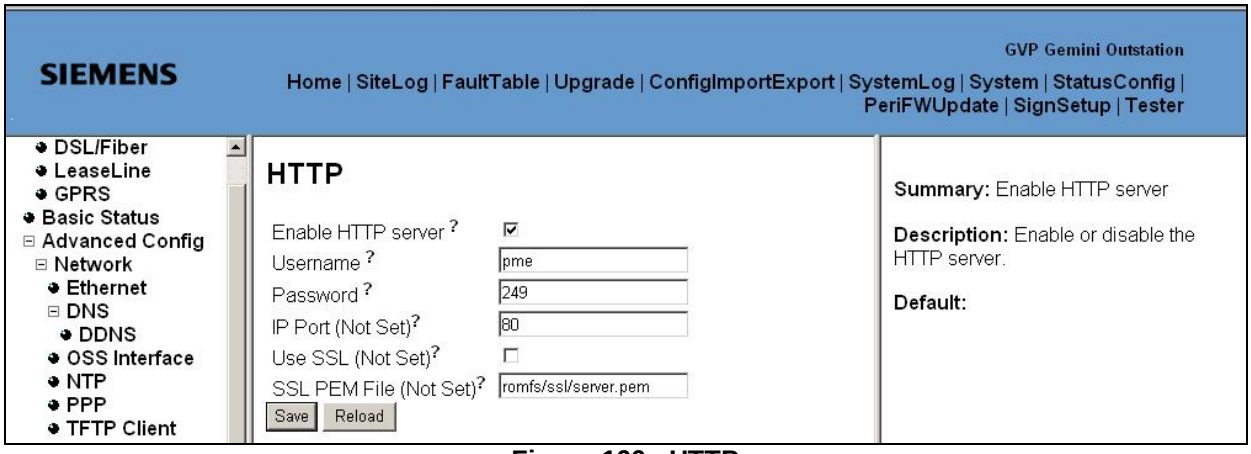


Figure 166 - HTTP

Enable HTTP server
Description: Enable or disable the HTTP server.
Default:

Username
Description: Configure the username needed for authentication.
Default:

Password
Description: Configure the password needed for authentication.
Default:

IP Port
Description: Configure the IP port that the HTTP server will use.
Default: 80

Use SSL
Description: Enable or Disable SSL. SSL provides an encription level to protect data send to and from the web server.
Default: false

SSL PEM File
Description: Configure the PEM (combined Certificate and private key) filename. This file is used by the server to setup the SSL connection to the HTTP client.
Default: romfs/ssl/server.pem

13.5.18 Terminal Screen

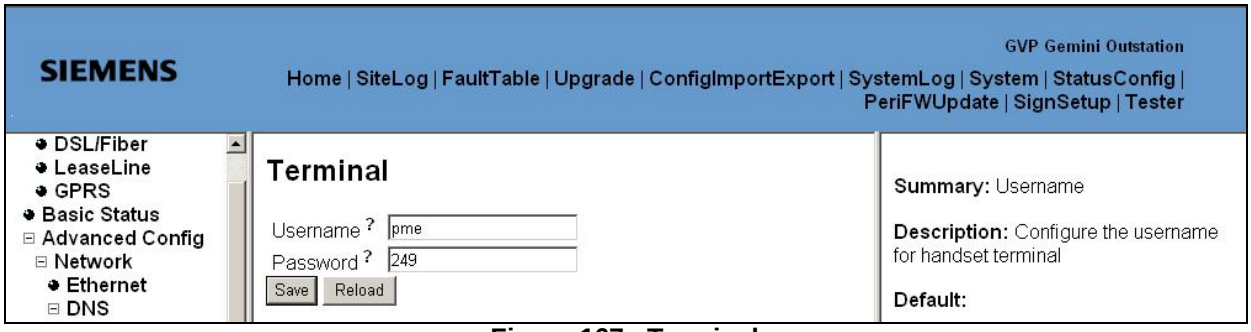


Figure 167 - Terminal

Username
Description: Configure the username for handset terminal.
Default:

Password
Description: Configure the password for handset terminal.
Default:

13.5.19 Digital IO Screen

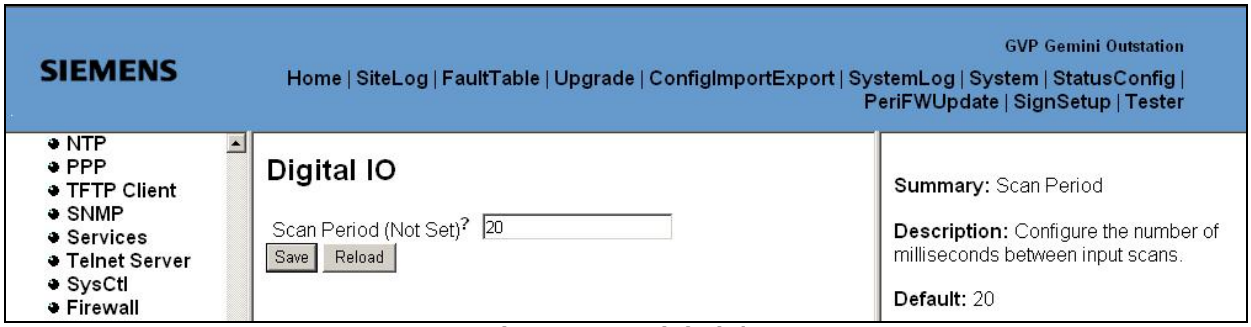


Figure 168 - Digital I/O

Scan Period
Description: Configure the number of milliseconds between input scans.
Default: 20

13.5.20 TCL Screen

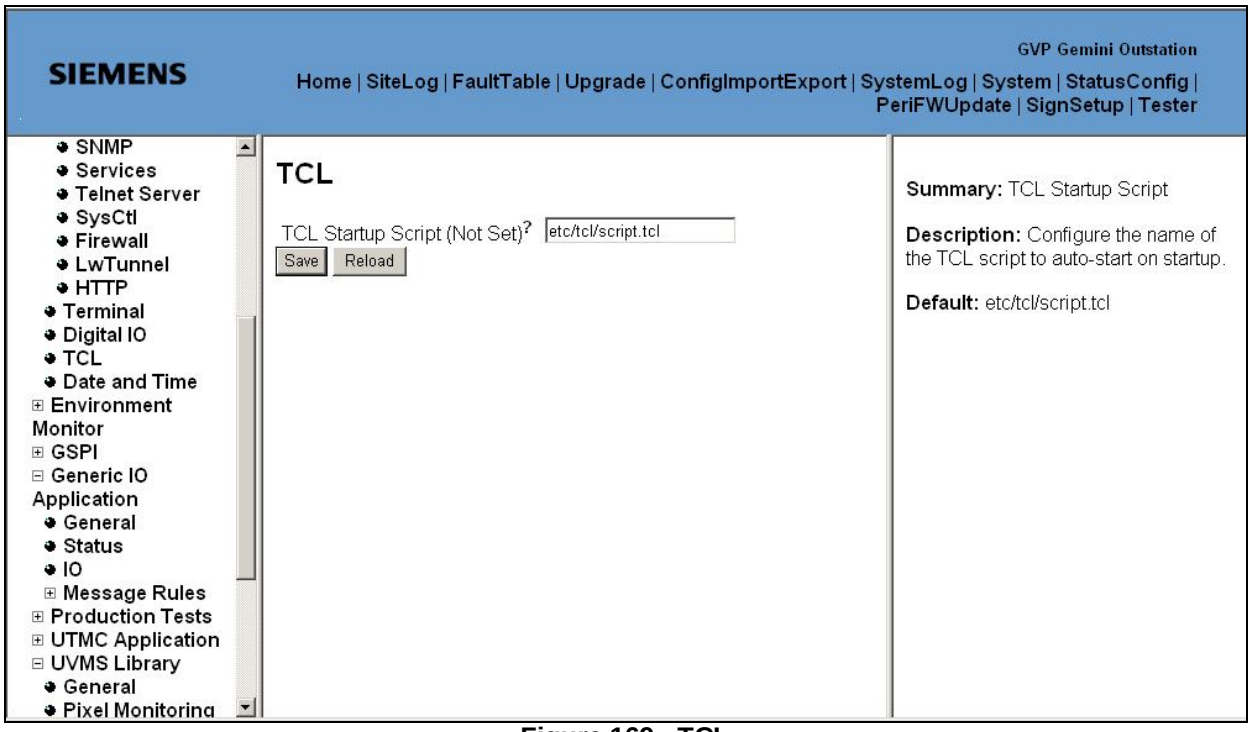


Figure 169 - TCL

TCL Startup Script
Description: Configure the name of the TCL script to auto-start on startup.
Default: etc/tcl/script.tcl

13.6 STATUSCONFIG: ENVIRONMENT MONITOR

13.6.1 General Screen

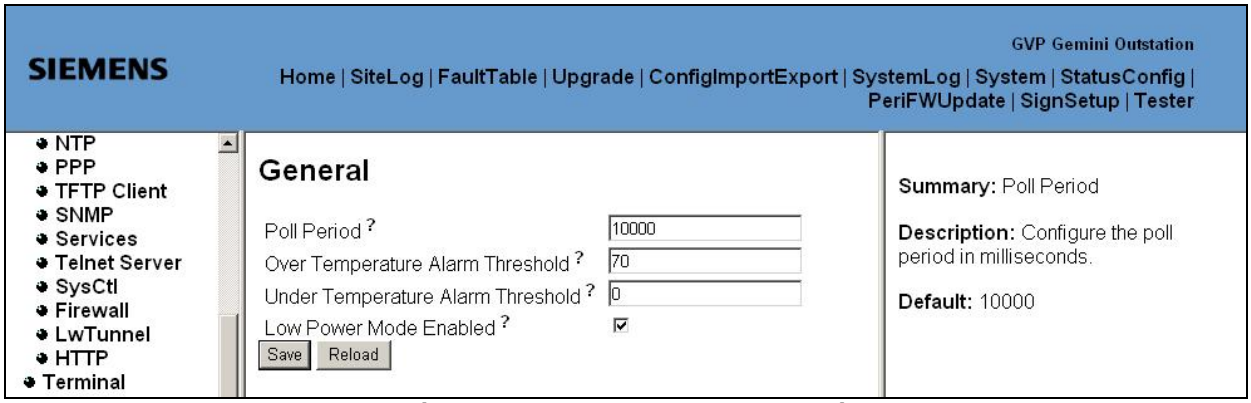


Figure 170 - Temperature - General

Poll Period
Description: Configure the poll period in milliseconds.
Default: 10000

Over Temperature Alarm Threshold
Description: Over temperature alarm threshold in degrees Celcius.
Default: 70

Under Temperature Alarm Threshold
Description: Under temperature alarm threshold in degrees Celcius.
Default: 0

Low Power Mode Enabled
Description: Control whether or not low power mode (status LEDs off) is entered when the door is closed:

- true = low power mode entered when door closed
- false = low power mode not used

Default: true

13.6.2 Status Screen

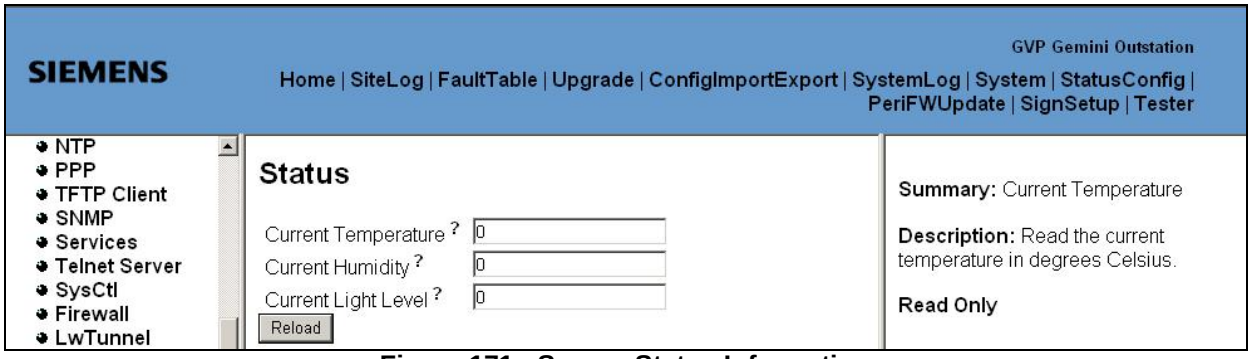


Figure 171 - Sensor Status Information

Current Temperature
Description: Read the current temperature in degrees Celsius.
Read Only

Current Humidity
Description: Read the current humidity in %.
Read Only

Current Light Level
Description: Read the current ambient light level in lux.
Read Only

13.6.3 Door

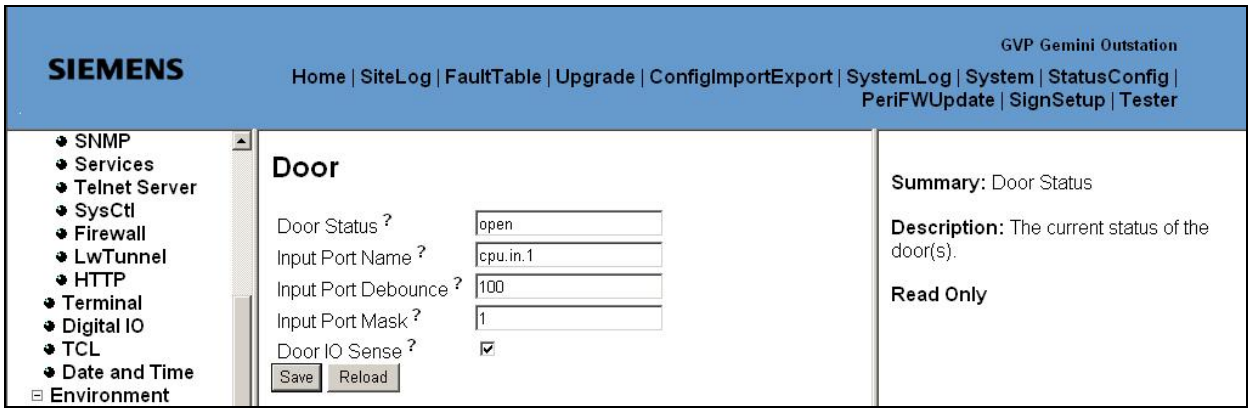


Figure 172 - Door Input Information

Door Status
Description: The current status of the door(s).
Read Only

Input Port Name
Description: Configure the name of the input port used to monitor the door.
Default: cpu.in.1

Input Port Debounce
Description: Configure the debounce applied to the input port in milliseconds.
Default: 100

Input Port Mask
Description: Configure the mask applied to the input port.
Default: 1

Door IO Sense
Description: The sense of the logic for the door IO input:

- true: closed cct=door closed, open cct=door open
- false: closed cct=door open, open cct=door closed

Default: true

13.6.4 Heater Screen

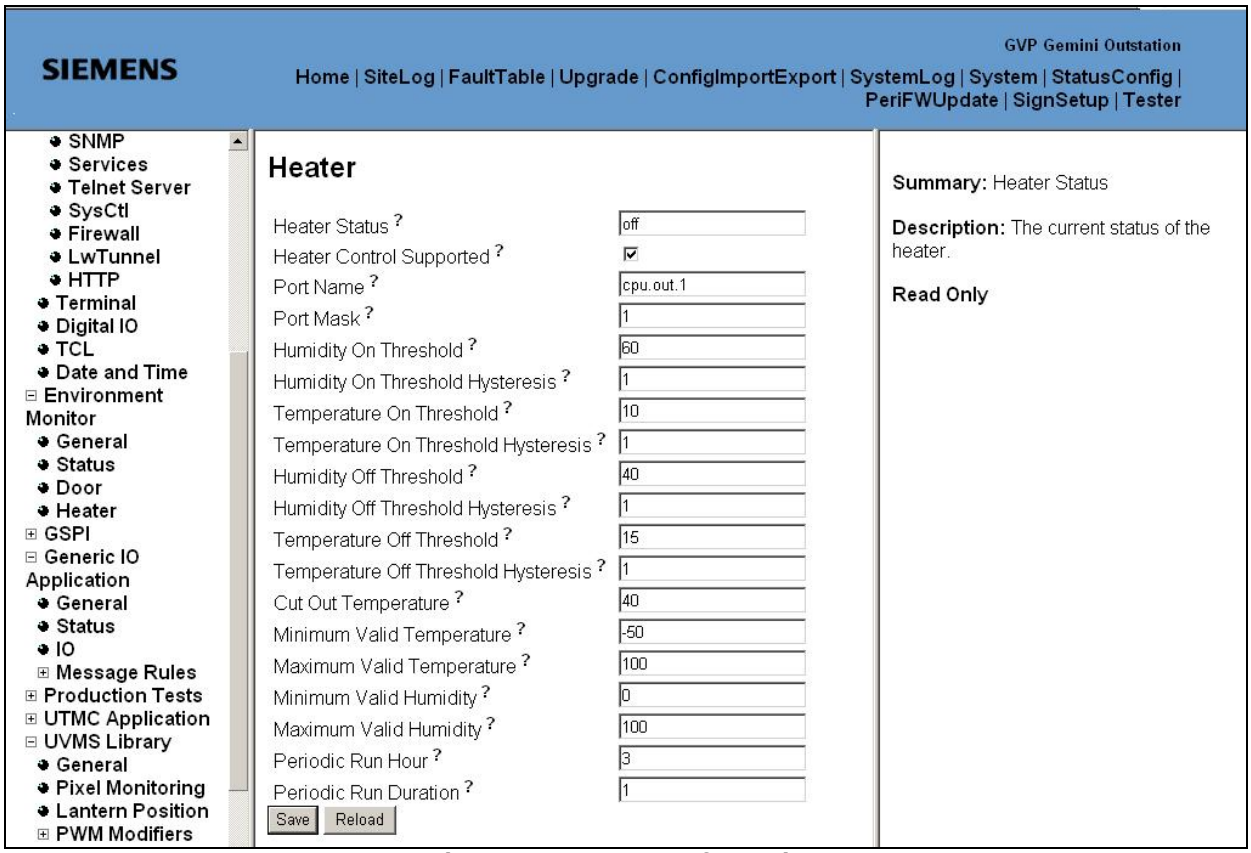


Figure 173 - Heater Information

Heater Status
Description: The current status of the heater.
Read Only

Heater Control Supported
Description: Configure whether control of the heater is supported.
Default: false

Port Name
Description: Configure the name of the IO port.
Default: cpu.out.1

Port Mask
Description: Configure the mask applied to the IO port.
Default: 1

Humidity On Threshold
Description: Configure the humidity threshold at which the heater is turned on.
Default: 60

Humidity On Threshold Hysteresis
Description: Configure the humidity threshold hysteresis for turning the heater on.
Default: 1

Temperature On Threshold
Description: Configure the temperature threshold at which the heater is turned on.
Default: 10

Temperature On Threshold Hysteresis
Description: Configure the temperature threshold hysteresis for turning the heater on.
Default: 1

Humidity Off Threshold
Description: Configure the humidity threshold at which the heater is turned off.
Default: 40

Temperature Off Threshold Hysteresis
Description: Configure the temperature threshold hysteresis for turning the heater off.
Default: 1

Cut Out Temperature
Description: The cut out temperature at which the heater is turned off regardless of humidity.
Default: 40

Minimum Valid Temperature
Description: The lowest temperature reading accepted as valid.
Default: -50

Maximum Valid Temperature
Description: The highest temperature reading accepted as valid.
Default: 100

Minimum Valid Humidity
Description: The lowest humidity reading accepted as valid.
Default: 0

Maximum Valid Humidity
Description: The highest humidity reading accepted as valid.
Default: 100

Periodic Run Hour
Description: The hour at which the periodic maintenance run should occur: 0 to 23 (24 hour notation).
Default: 3

Periodic Run Duration
Description: The duration for which the periodic maintenance run should last: 1 to 9 minutes.
Default: 1

13.7 STATUSCONFIG: GSPI

13.7.1 General

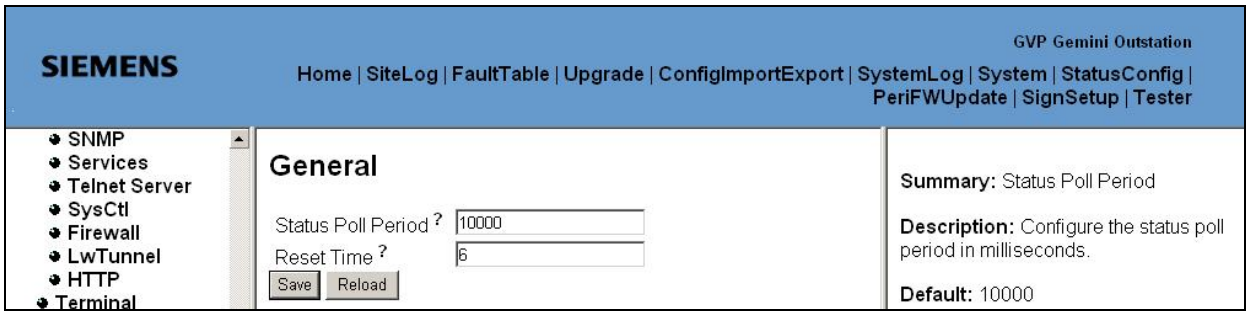


Figure 174 - General

Status Poll Period
Description: Configure the status poll period in milliseconds.
Default: 10000

Reset Time
Description: The time allowed (in seconds) for each peripheral to reset when scanning the GSPI bus. Reducing this time can allow faster startup for signs with short rows. Increasing this time allows more time for longer rows to initialise.
Default: 6

13.7.2 Status

13.7.2.1 Luminance Screen

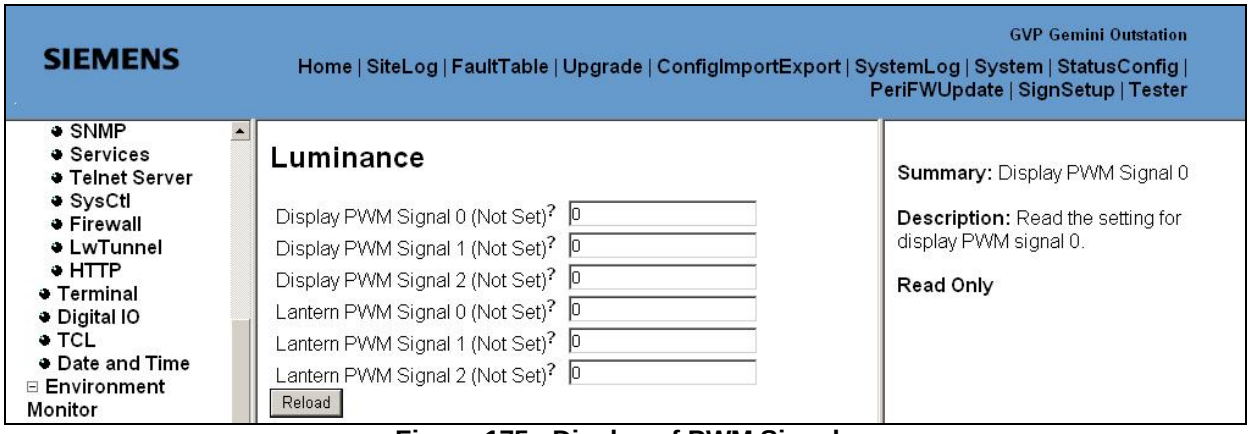


Figure 175 - Display of PWM Signals

Display PWM Signal 0
Description: Read the setting for display PWM signal 0.
Read Only

Display PWM Signal 1
Description: Read the setting for display PWM signal 1.
Read Only

Display PWM Signal 2
Description: Read the setting for display PWM signal 2.
Read Only

Lantern PWM Signal 0
Description: Read the setting for lantern PWM signal 0.
Read Only

Lantern PWM Signal 1
Description: Read the setting for lantern PWM signal 1.
Read Only

Lantern PWM Signal 2
Description: Read the setting for lantern PWM signal 2.
Read Only

13.7.2.2 Communications Screen

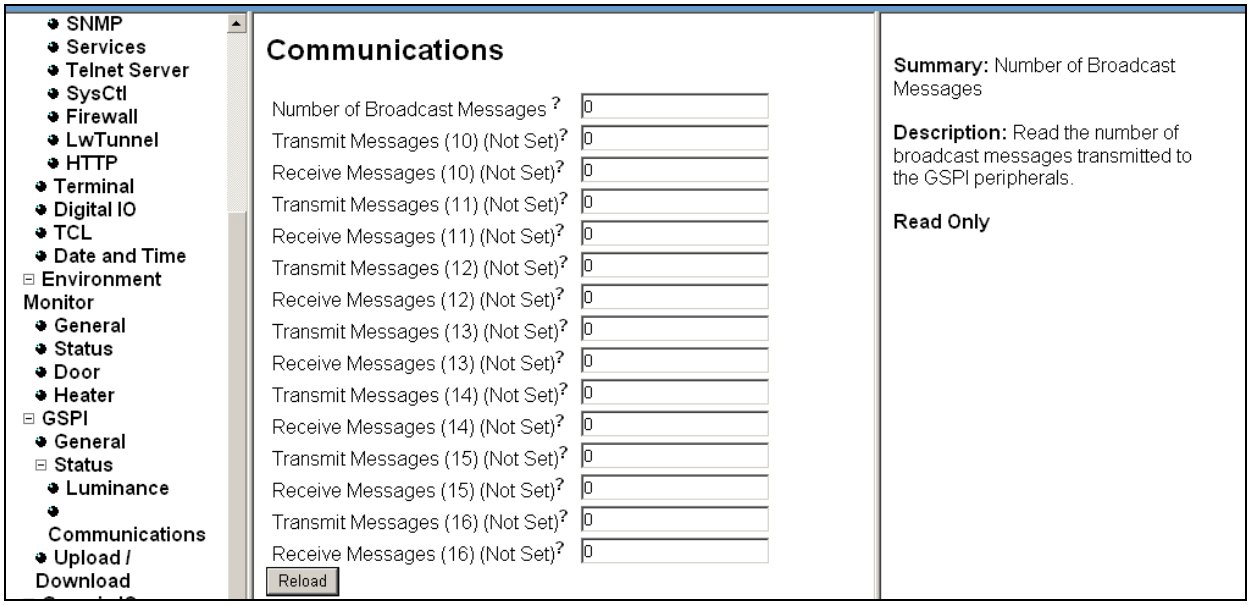


Figure 176 - Communications

Number of Broadcast Messages
Description: Read the number of broadcast messages transmitted to the GSPI peripherals.
Read Only

Transmit Messages (n)
Description: Read the number of messages transmitted to GSPI peripheral with address n.
Read Only

Receive Messages (n)
Description: Read the number of messages received from GSPI peripheral with address n.
Read Only

13.7.3 Upload/Download Screen

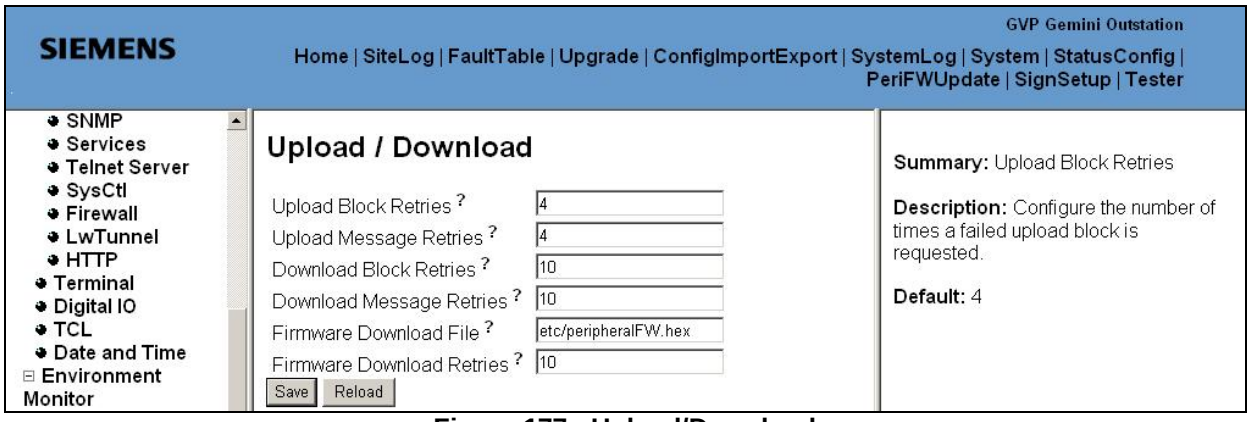


Figure 177 - Upload/Download

Upload Block Retries
Description: Configure the number of times a failed upload block is requested.
Default: 4

Upload Message Retries
Description: Configure the number of times a failed upload message is retried.
Default: 4

Download Block Retries
Description: Configure the number of times a failed download block is resent.
Default: 10

Download Block Retries
Description: Configure the number of times a failed download block is resent.
Default: 10

Firmware Download File
Description: Configure the name of the firmware download image file.
Default: etc/peripheralFW.hex

Firmware Download Retries
Description: Configure the number of times a failed firmware download is retried.
Default: 10

13.8 STATUSCONFIG: GENERIC IO APPLICATION

13.8.1 General

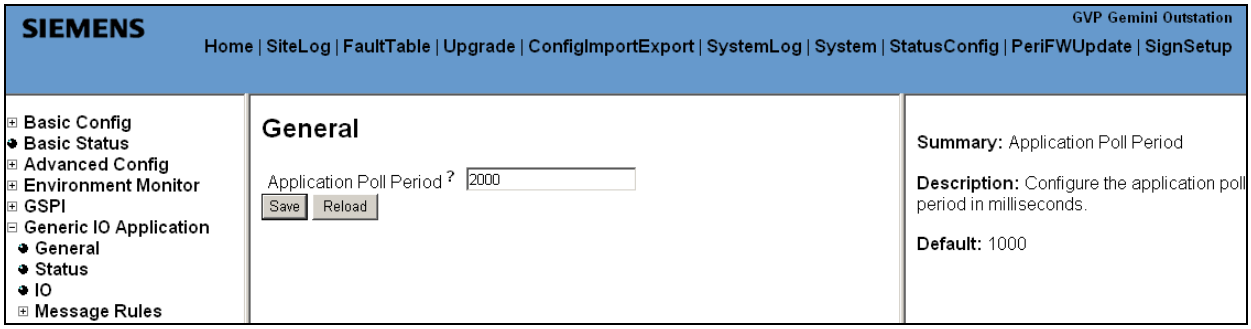


Figure 178 - Generic IO Application, General

Application Poll Period
Description: Configure the application poll period in milliseconds.
Default: 1000

13.8.2 Status

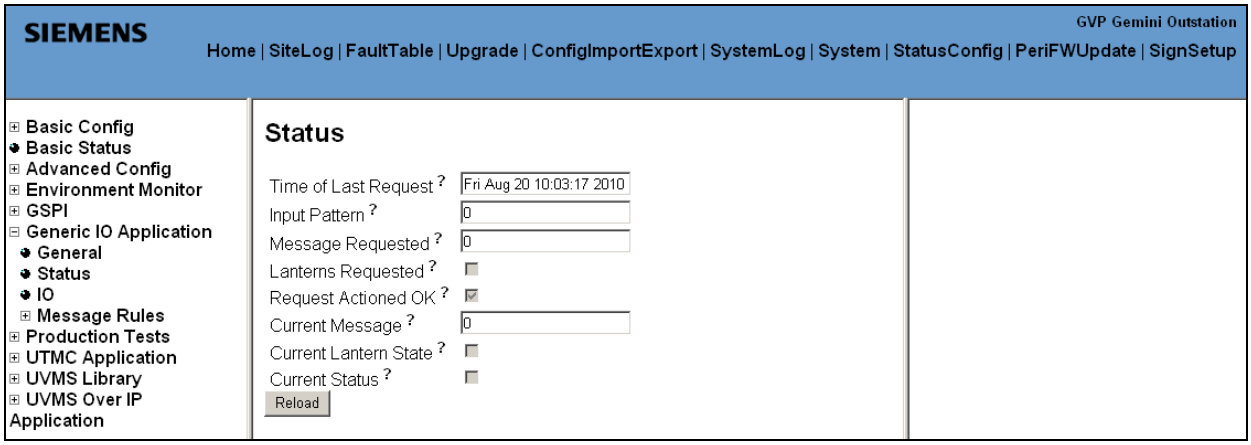


Figure 179 - Generic IO Application, Status

Time of Last Request
Description: Read the time of the last request.
Read Only

Input Pattern
Description: Read the current input pattern.
Read Only

Message Requested
Description: Read the requested message derived from the input pattern.
Read Only

Lanterns Requested
Description: Read the requested lanterns from the input pattern.
Read Only

Request Actioned OK
Description: Read the actioned status of the last request.
Read Only

Current Message
Description: Message currently displayed.
Read Only

Current Lantern State
Description: Current lantern state.
Read Only

Current Status
Description: Result of the last update.
Read Only

13.8.3 IO

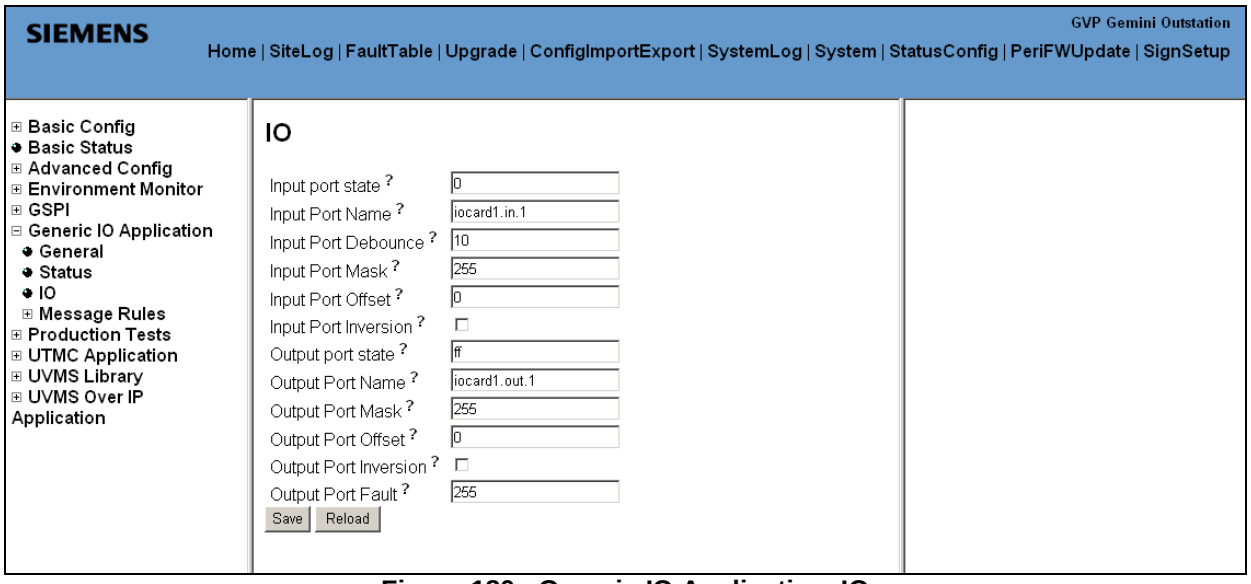


Figure 180 - Generic IO Application, IO

Input port state
Description: State of inputs as used by the application
Read Only

Input Port Name
Description: Configure the name of the input port.
Default: iocard1.in.1

Input Port Debounce
Description: Configure the debounce applied to the input port in milliseconds
Default: 10

Input Port Mask
Description: Configure the mask applied to the input port (unshifted).
Default: 255

Input Port Offset
Description: Configure the offset applied to the input port.
Default: 0

Input Port Inversion
Description: Indicates whether or not the data read from the input port is inverted before use.
Default: false

Output port state
Description: State of outputs as requested by the application
Read Only

Output Port Name
Description: Configure the name of the output port.
Default: iocard1.out.2

Output Port Mask
Description: Configure the mask applied to the output port (unshifted).
Default: 255

Output Port Offset
Description: Configure the offset applied to the output port.
Default: 0

Output Port Inversion
Description: Indicates whether or not the data written to the output port is inverted before use.
Default: false

Output Port Fault
Description: Configure which bits indicate a fault on the output port.
Default: 255

13.8.4 Message Rules Screen

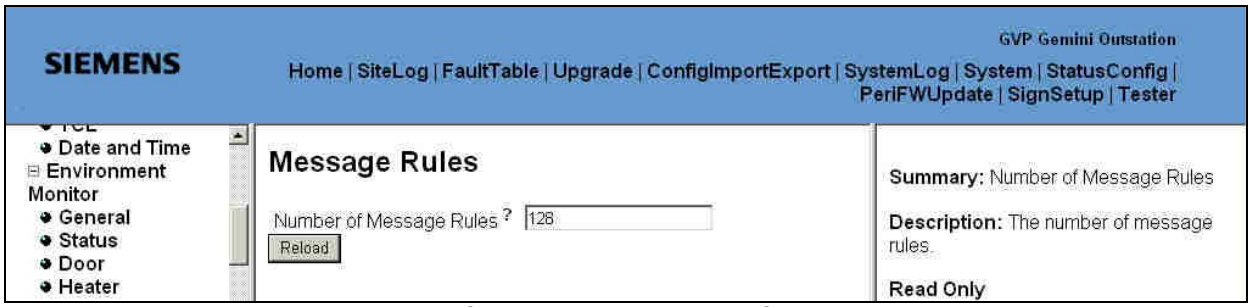


Figure 181 - Message Rules

Number of Message Rules
Description: The number of message rules.
Read Only

13.8.4.1 Rule Screen – Rule n

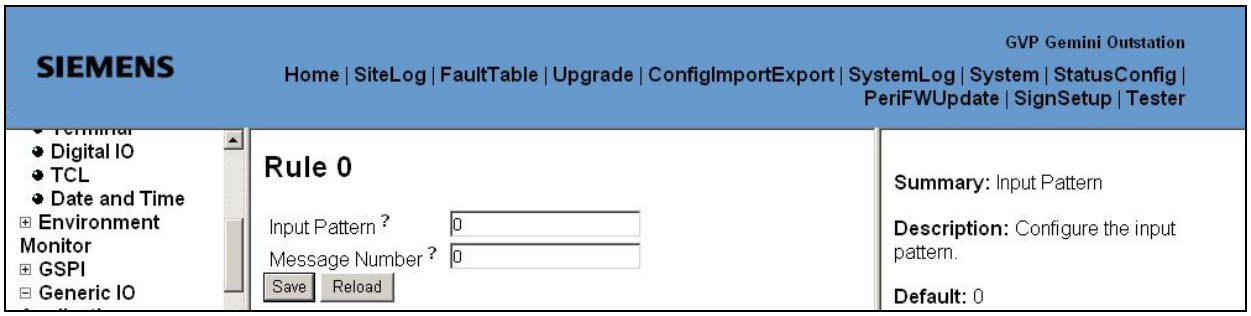


Figure 182 - Rule 0

The number of Rule screens is determined by the number of message rules specified on the Message Rules screen (seeFigure 181). Each rule is used to map an input pattern (as received on the controlling IO interface) to a preset message (see section 13.11.8 for how to define preset messages).

Input Pattern
Description: Configure the input pattern.
Default: 0

Message Number
Description: Configure the message number.
Default: 0

13.9 STATUSCONFIG: PRODUCTION TESTS

13.9.1 General

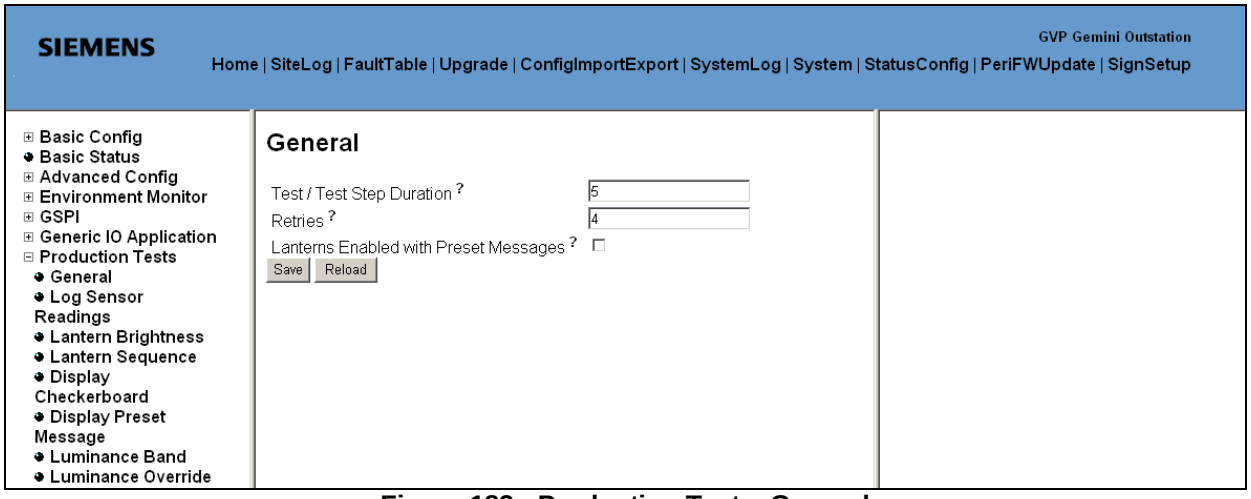


Figure 183 - Production Tests, General

Test / Test Step Duration
Description: Configure the test or test step duration in seconds.
Default: 20

Retries
Description: Configure the number of retries.
Default: 4

Lanterns Enabled with Preset Messages
Description: Enable / disable lanterns with preset messages.
Default: false

13.9.2 Log Sensor Readings

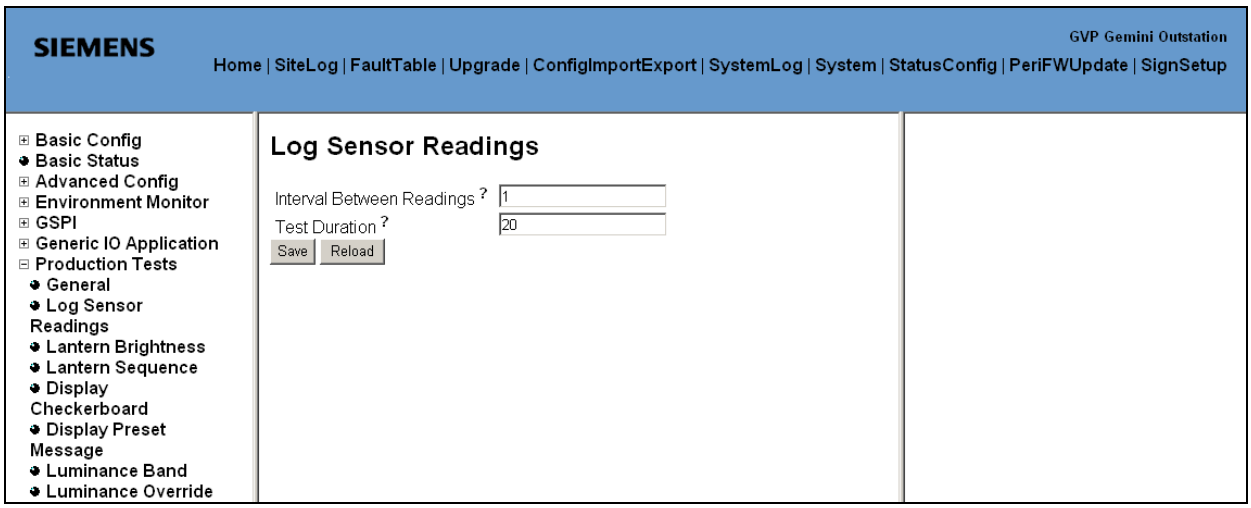


Figure 184 - Production Tests, Log Sensor Readings

Interval Between Readings
Description: Configure the interval between readings in seconds.
Default: 1

Test Duration
Description: Configure the test duration in seconds.
Default: 20

13.9.3 Lantern Brightness

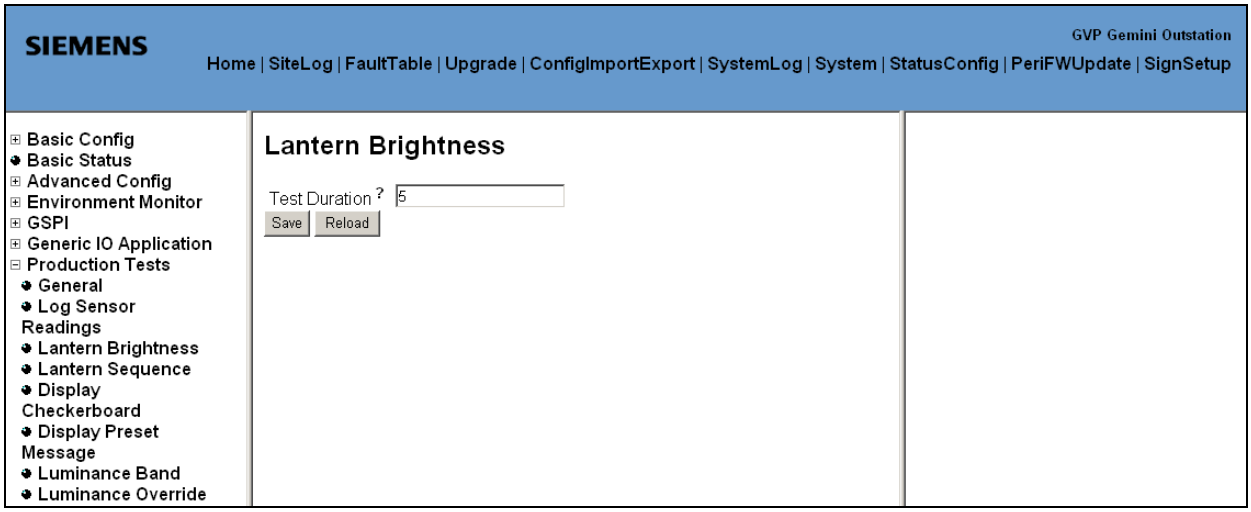


Figure 185 - Production Tests, Lantern Brightness

Test Duration
Description: Configure the test duration in seconds.
Default: 20

13.9.4 Lantern Sequence

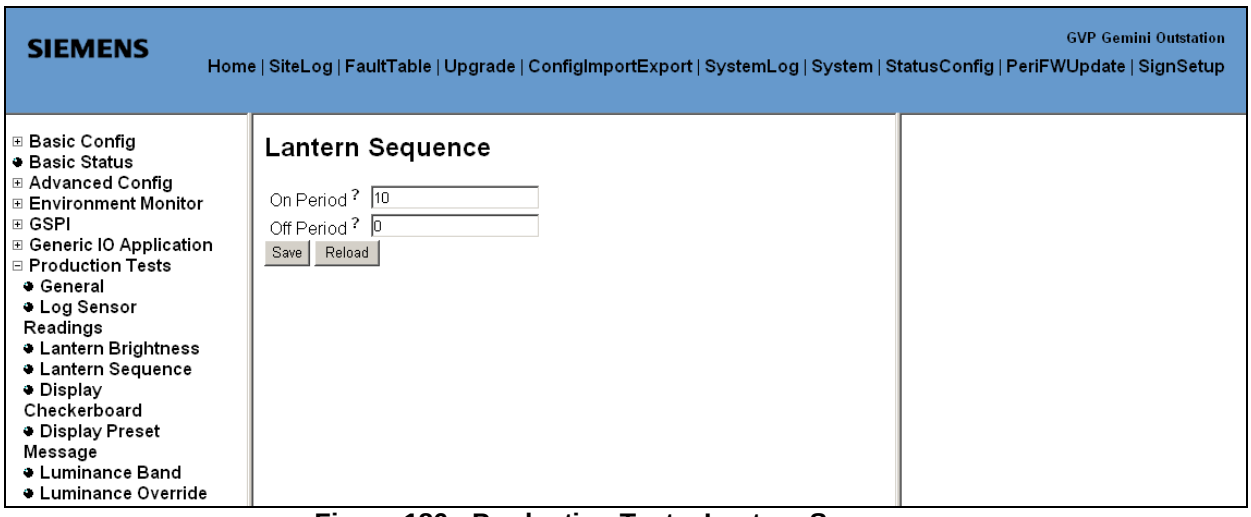


Figure 186 - Production Tests, Lantern Sequence

On Period
Description: Configure the lantern on period in seconds.
Default: 20

Off Period
Description: Configure the lantern off period in seconds.
Default: 0

13.9.5 Display Checkerboard

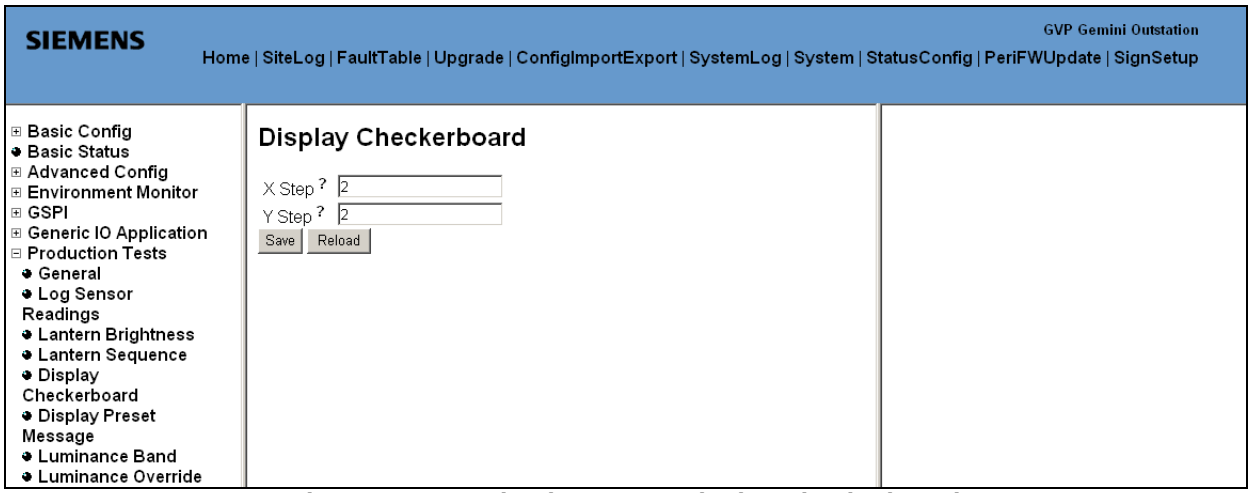


Figure 187 - Production Tests, Display Checkerboard

X Step
Description: Configure the X (horizontal) step value (in pixels).
Default: 7

Y Step
Description: Configure the Y (vertical) step value (in pixels).
Default: 7

13.9.6 Display Preset Message

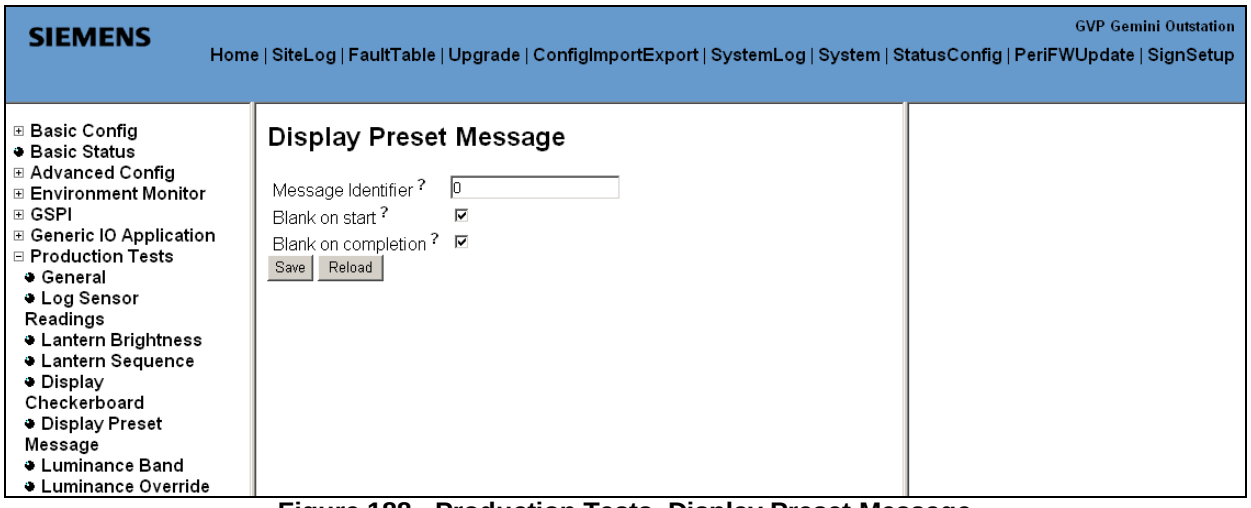


Figure 188 - Production Tests, Display Preset Message

Message Identifier
Description: Configure the identifier of the preset message to display.
Default: 0

Blank on start
Description: Controls whether or not the sign will be blanked on start of the display preset message tests
Default: true

Blank on completion
Description: Controls whether or not the sign will be blanked on completion of the display preset message tests
Default: true

13.9.7 Luminance Band

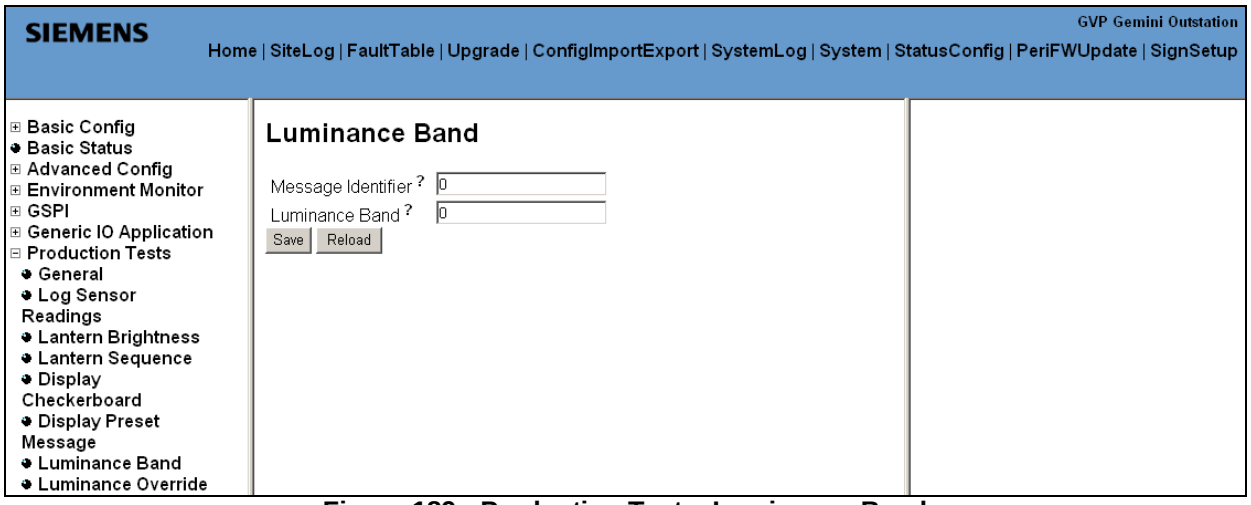


Figure 189 - Production Tests, Luminance Band

Message Identifier
Description: Configure the identifier of the preset message to display.
Default: 0

Luminance Band
Description: The luminance band used for the sign (0 to 4).
Default: 0

13.9.8 Luminance Override

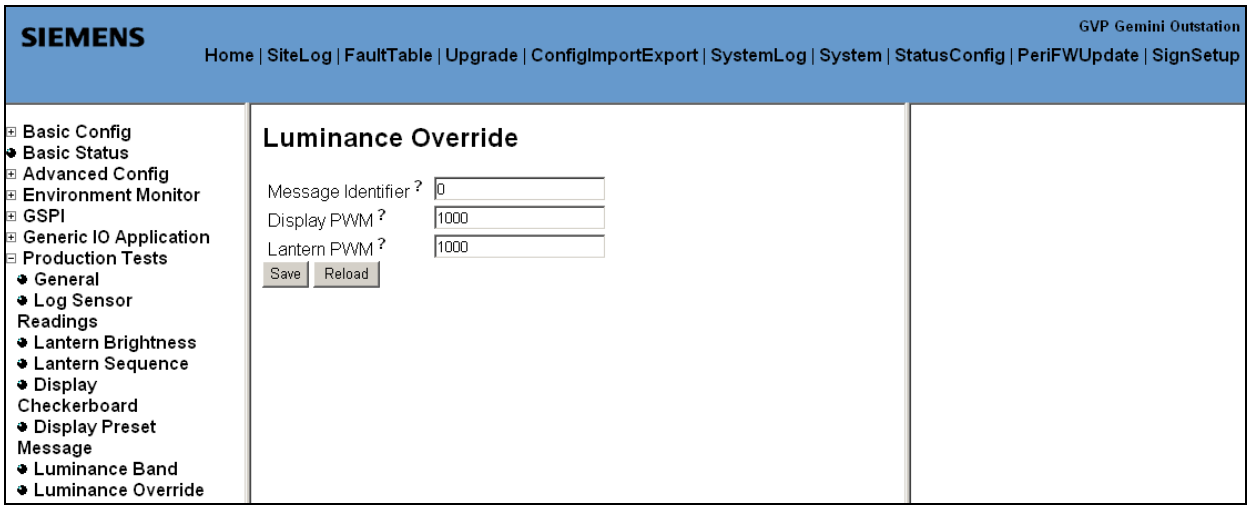


Figure 190 - Production Tests, Luminance Override

Message Identifier
Description: Configure the identifier of the preset message to display.
Default: 0

Display PWM
Description: The PWM used for the display boards (0 to 10000).
Default: 1000

Lantern PWM
Description: The PWM used for the lantern boards (0 to 10000).
Default: 1000

13.10 STATUSCONFIG: UTMC APPLICATION

13.10.1 General

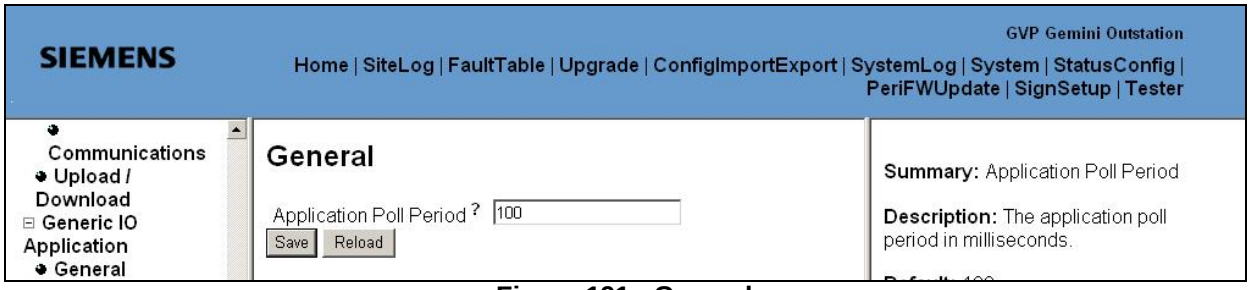


Figure 191 - General

Application Poll Period
Description: The application poll period in milliseconds.
Default: 100

13.10.2 Instation Compatibility

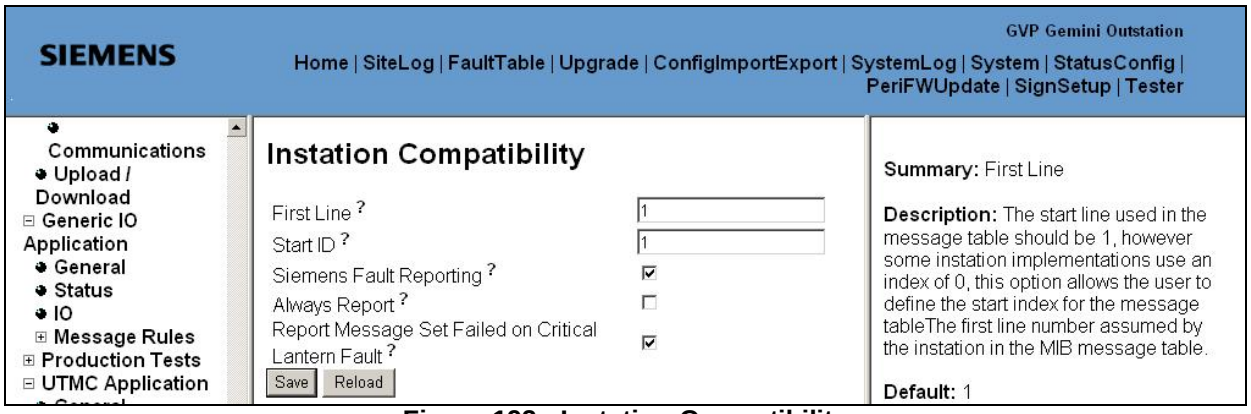


Figure 192 - Instation Compatibility

First Line
Description: The start line used in the message table should be 1, however some instation implementations use an index of 0, this option allows the user to define the start index for the message tableThe first line number assumed by the instation in the MIB message table.
Default: 1

Start ID
Description: Set start sign id to match the value configured / expected at the instation.
Default: 0

Siemens Fault Reporting
Description: Enable or Disable Siemens specific manufacture Fault Description field. When this option is enabled, the faultDescription OID in the MIB is used to show a non-MIB reportable fault has been detected.
Default: false

Always Report
Description: Enable to always report system faults using the Fault Description Field. This option has no effect unless the Siemens Fault Reporting option is also enabled.
Default: true

Report Message Set Failed on Critical Lantern Fault
Description: If true then will report that message set failed in addition to lantern failure when the sign is blanked due to a lantern fault. Useful for instation compatibility.
Default: true

13.10.3 MIB Config

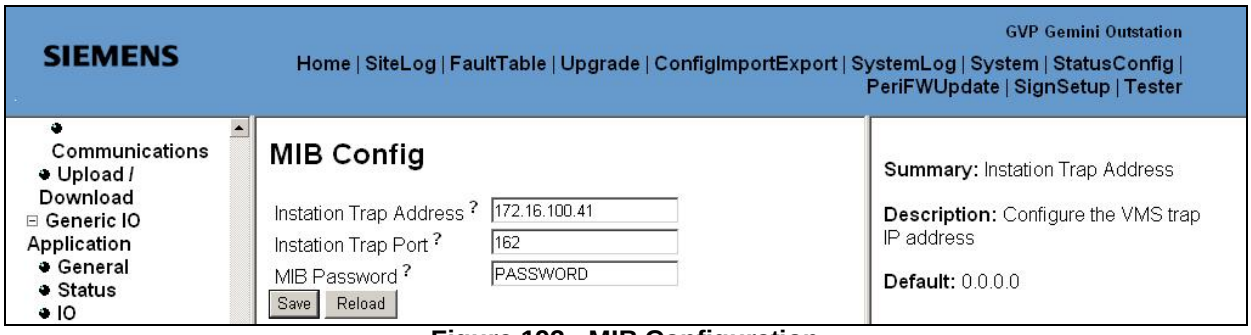


Figure 193 - MIB Configuration

Instation Trap Address
Description: Configure the VMS trap IP address.
Default: 0.0.0.0

Instation Trap Port
Description: Configure the VMS trap port number.
Default: 162

MIB Password
Description: Configure the UTMC VMS MIB password.
Default: no default

13.10.4 Sign Setup

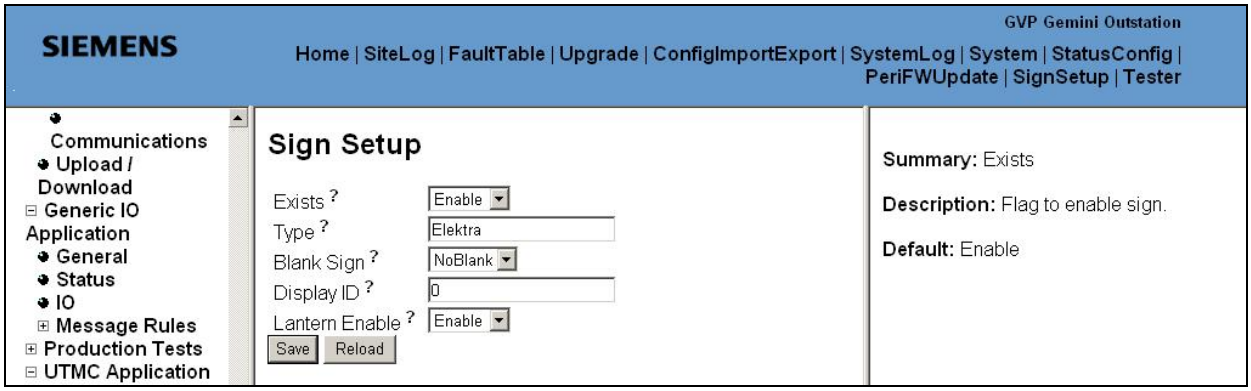


Figure 194 - Sign Setup

Exists
Description: Flag to enable sign.
Default: Enable

Type
Description: Configure a text field to define the sign type.
Default: Elektra

Blank Sign
Description: Configure the sign to blank on a fault.
Default: Blank

Display ID
Description: Display ID, needs to be set to 0.
Default: 0

Lantern Enable
Description: Configure Lanterns to be enabled or disabled.
Default: Disable

13.10.4.1 Display

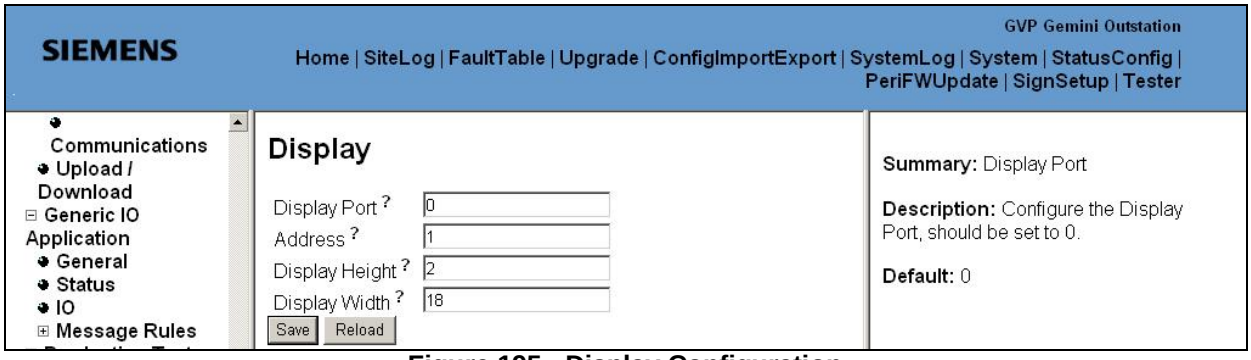


Figure 195 - Display Configuration

Display Port
Description: Configure the Display Port, should be set to 0.
Default: 0

Address
Description: Configure the Display Address.
Default: 1

Display Height
Description: Configure the Display Height in rows.
Default: 0

Display Width
Description: Configure the Display Width in characters.
Default: 0

13.10.4.2 Lantern

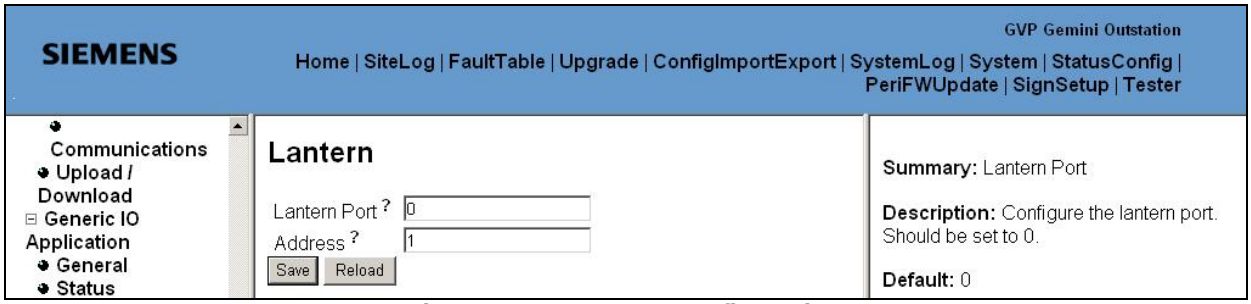


Figure 196 - Lantern Configuration

Lantern Port
Description: Configure the lantern port. Should be set to 0.
Default: 0

Address
Description: Configure the lantern address.
Default: 1

13.10.5 Comms Check

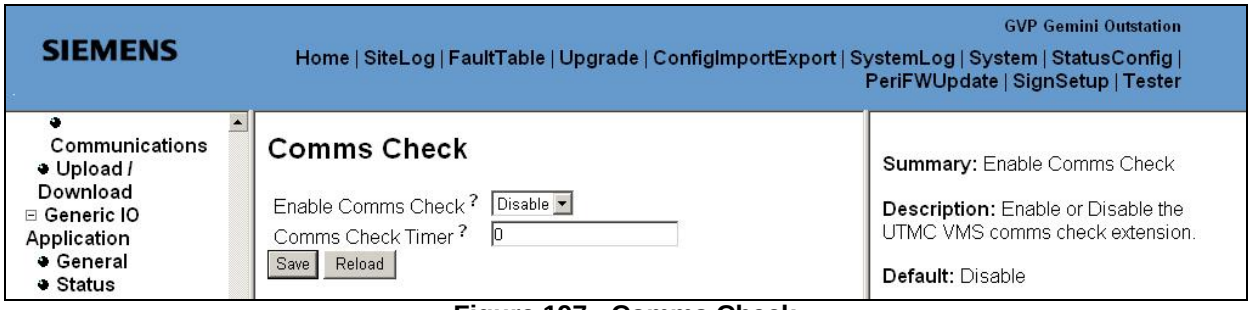


Figure 197 - Comms Check

Enable Comms Check
Description: Enable or Disable the UTMC VMS comms check extension.
Default: Disable

Comms Check Timer
Description: Confgure the number of minutes to wait before triggering a comms check event.
Default: 60

13.10.6 Luminance Override

13.10.6.1 Display

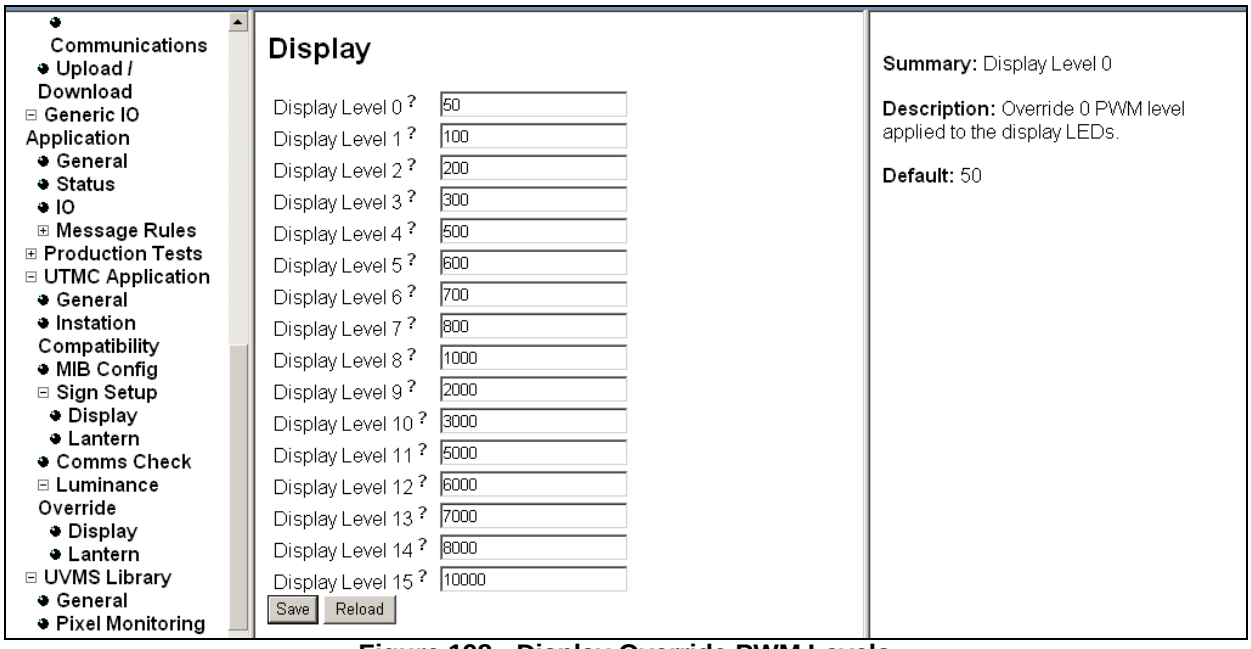


Figure 198 - Display Override PWM Levels

Fifteen override levels exist, each specified as follows.

Display Level n
Description: Override n PWM level applied to the display LEDs.
Default: depends on n

13.10.6.2 Lantern

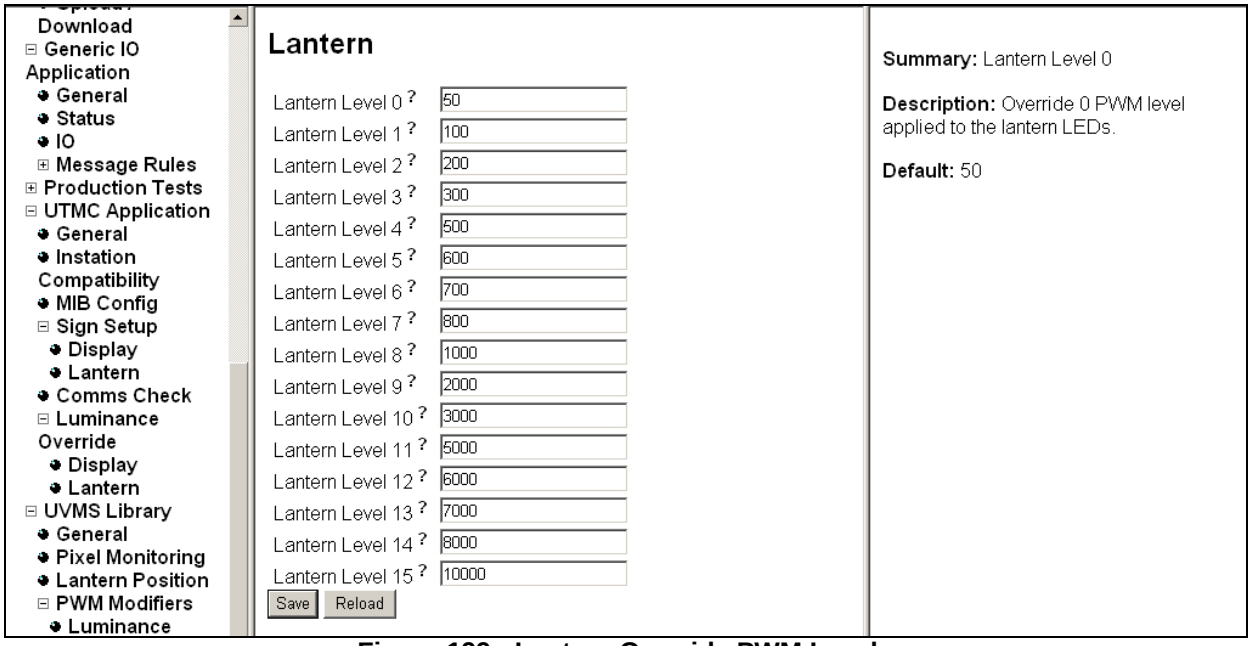


Figure 199 - Lantern Override PWM Levels

Fifteen override levels exist, each specified as follows.

Lantern Level n
Description: Override n PWM level applied to the lantern LEDs.
Default: depends on n

13.11 STATUSCONFIG: UVMS LIBRARY

13.11.1 General

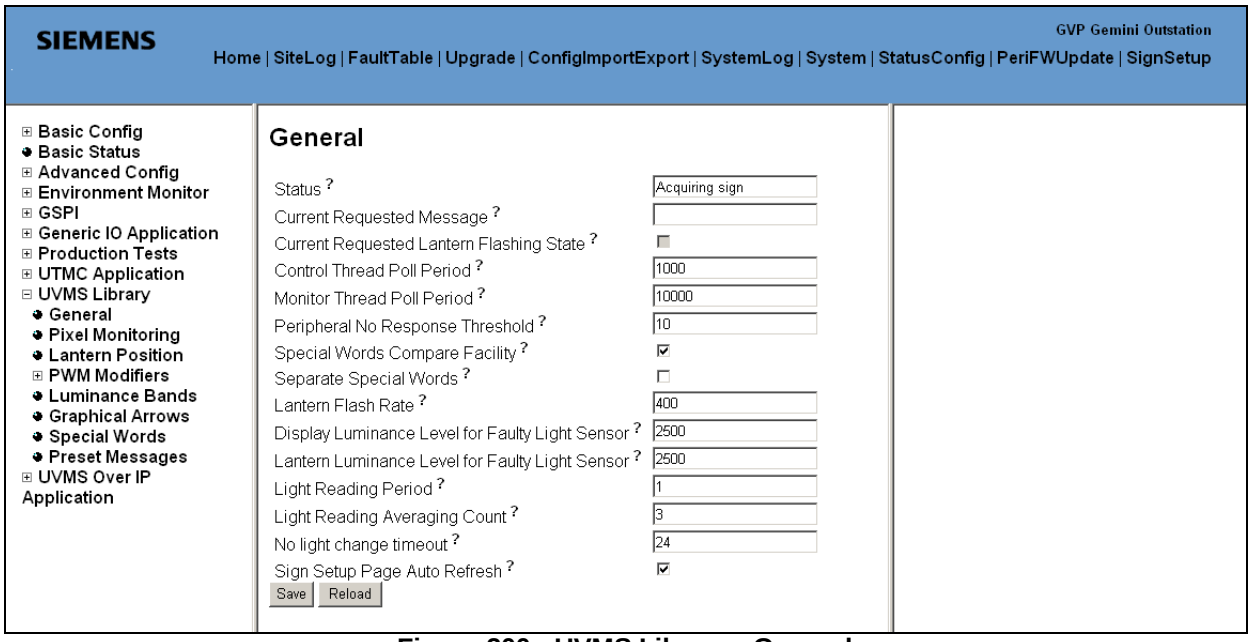


Figure 200 - UVMS Library - General

Status
Description: The current status.
Read Only

Current Requested Message
Description: The message currently requested to be displayed on the sign.
Read Only

Current Requested Lantern Flashing State
Description: The currently requested flashing state of the lanterns on the sign.
Read Only

Control Thread Poll Period
Description: Configure the control thread poll period in milliseconds.
Default: 1000

Monitor Thread Poll Period
Description: Configure the monitor thread poll period in milliseconds.
Default: 1000

Peripheral No Response Threshold
Description: The number of GSPI poll messages allowed to be missed before the peripheral is deemed missing.
Default: 10

Special Words Compare Facility
Description: Configure the sign to support the special word compare facility.
Default: false

Separate Special Words
Description: If selected special words are only detected if separated by spaces from other words.
Default: false

Lantern Flash Rate
Description: Configure the lantern flash rate in milliseconds.
Default: 400

Display Luminance Level for Faulty Light Sensor
Description: Configure the the display luminance level when the light sensor is faulty.
Default: 2500

Lantern Luminance Level for Faulty Light Sensor
Description: Configure the the lantern luminance level when the light sensor is faulty.
Default: 2500

Light Reading Period
Description: Configure the time between light readings in minutes.
Default: 1

Light Reading Averaging Count
Description: Configure the the number of light readings which are averaged.
Default: 3

No light change timeout
Description: Timeout (in hours) for detection of no light change e.g. to detect opaque light sensor.
Default: 24

Sign Setup Page Auto Refresh
Description: Controls whether or not the sign setup web page automatically refreshes.
Default: true

13.11.2 Pixel Monitoring

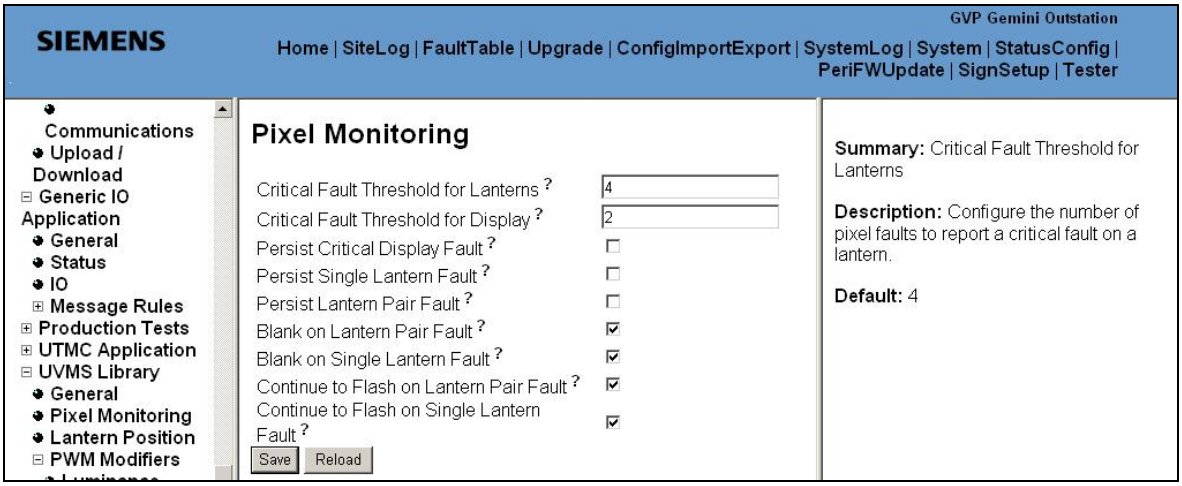


Figure 201 - Pixel Monitoring

Critical Fault Threshold for Lanterns
Description: Configure the number of pixel faults to report a critical fault on a lantern.
Default: 4

Critical Fault Threshold for Display
Description: Configure the number of pixel faults in a character to report a critical fault on the display.
Default: 2

Persist Critical Display Fault
Description: If selected then critical display faults are persisted until a restart. This can be useful for compatibility with instations. Deselection can be used to restore the critical display fault status to the current value.
Default: true

Persist Single Lantern Fault
Description: If selected then single lantern faults are persisted until a restart. This can be useful for compatibility with instations. Deselection can be used to restore the single lantern fault status to the current value.
Default: true

Persist Lantern Pair Fault
Description: If selected then lantern pair faults are persisted until a restart. This can be useful for compatibility with instations. Deselection can be used to restore the lantern pair fault status to the current value.
Default: true

Blank on Lantern Pair Fault
Description: If selected then lantern pair faults cause the sign to blank.
Default: true

Blank on Single Lantern Fault
Description: If selected then single lantern faults cause the sign to blank.
Default: true

Continue to Flash on Lantern Pair Fault
Description: If selected then lanterns will continue to flash when pair faults have been detected if sign not blanked.
Default: true

Continue to Flash on Single Lantern Fault
Description: If selected then lanterns will continue to flash when single lantern faults have been detected if sign not blanked.
Default: true

13.11.3 Lantern Position

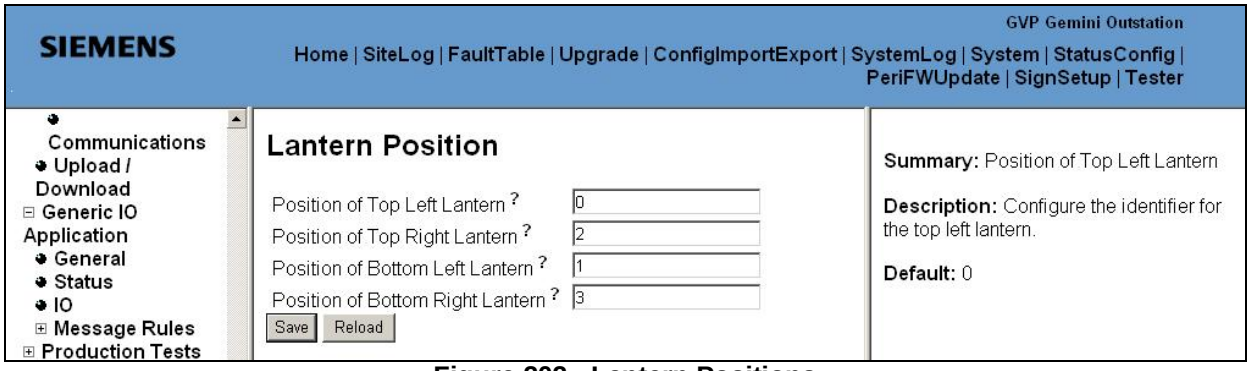


Figure 202 - Lantern Positions

Position of Top Left Lantern
Description: Configure the identifier for the top left lantern.
Default: 0

Position of Top Right Lantern
Description: Configure the identifier for the top right lantern.
Default: 1

Position of Bottom Left Lantern
Description: Configure the identifier for the bottom left lantern.
Default: 2

Position of Bottom Right Lantern
Description: Configure the identifier for the bottom right lantern.
Default: 3

13.11.4 PWM Modifiers

Modifiers are available for each of the Luminance Bands to tailor the PWM to match display colour and / or size.

13.11.4.1 Luminance Band Modifier - Band n

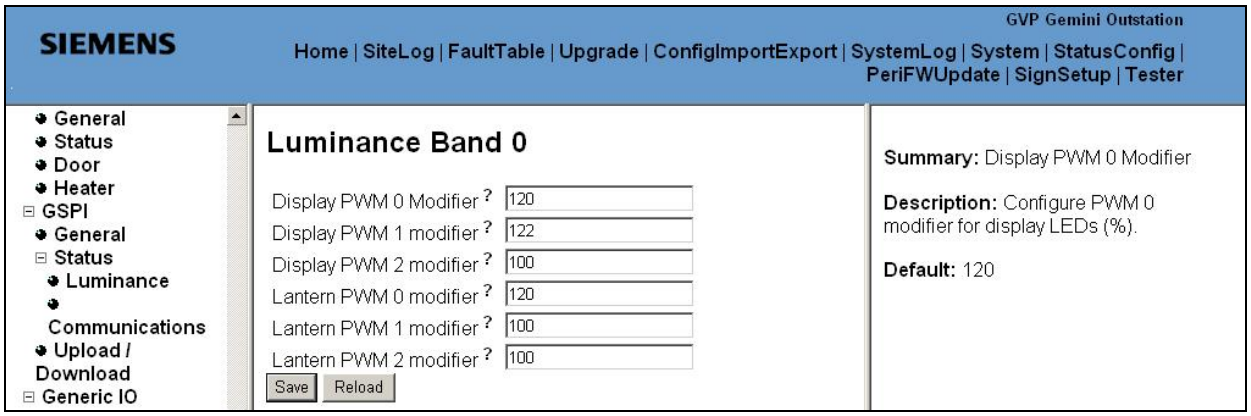


Figure 203 - Luminance Modifiers - Band n

Display PWM 0 Modifier
Description: Configure PWM 0 modifier for display LEDs (%).
Default: depends on Luminance Band

Display PWM 1 modifier
Description: Configure PWM 1 modifier for display LEDs (%).
Default: depends on Luminance Band

Display PWM 2 modifier
Description: Configure PWM 2 modifier for display LEDs (%).
Default: depends on Luminance Band

Lantern PWM 0 modifier
Description: Configure PWM 0 modifier for lantern LEDs (%).
Default: depends on Luminance Band

Lantern PWM 1 modifier
Description: Configure PWM 0 modifier for lantern LEDs (%).
Default: depends on Luminance Band

Lantern PWM 2 modifier
Description: Configure PWM 0 modifier for lantern LEDs (%).
Default: depends on Luminance Band

13.11.5 Luminance Bands

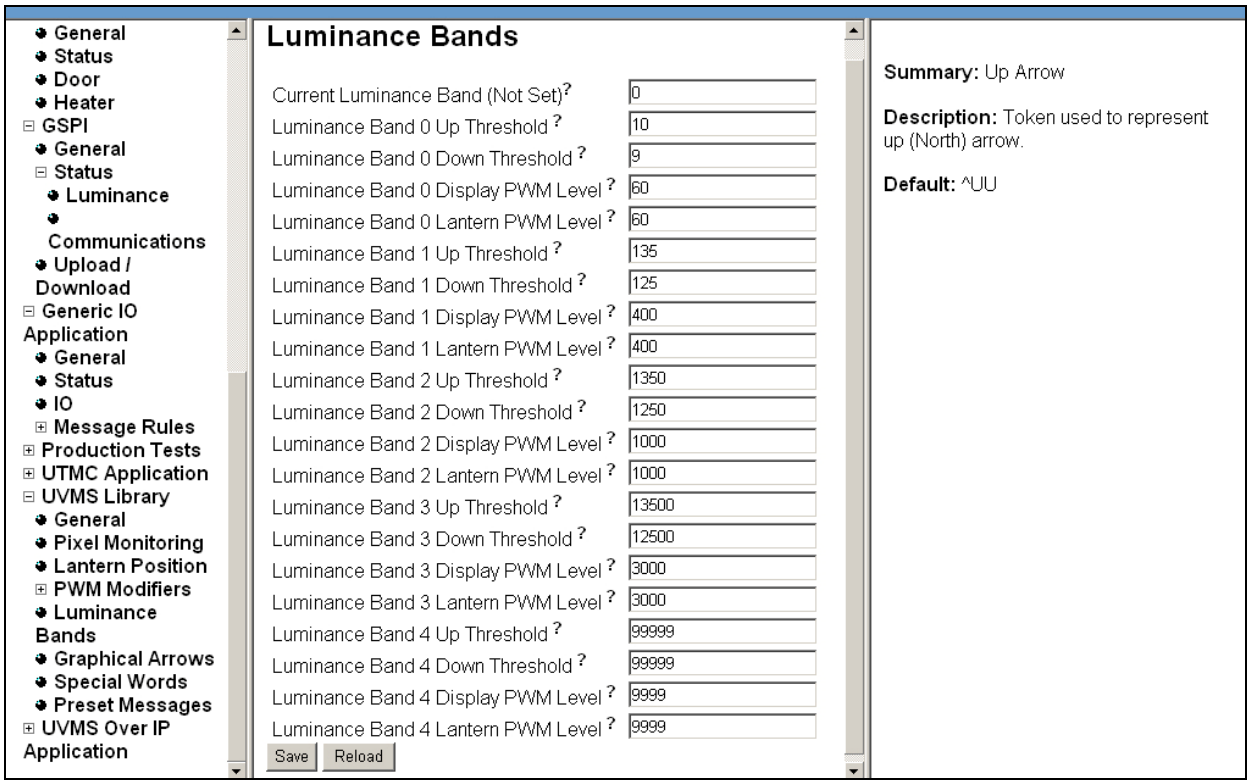


Figure 204 - Luminance Bands

Current Luminance Band
Description: The luminance band in use if not overridden.
Read Only

There are five Luminance Bands each defined using four parameters as follows:

Luminance Band n Up Threshold
Description: Configure the up threshold for luminance band n.
Default: depends on Luminance Band

Luminance Band n Down Threshold
Description: Configure the down threshold for luminance band n.
Default: depends on Luminance Band

Luminance Band n Display PWM Level
Description: Configure the Display PWM level for luminance band n.
Default: depends on Luminance Band

Luminance Band n Lantern PWM Level
Description: Configure the Lantern PWM level for luminance band n.
Default: depends on Luminance Band

13.11.6 Graphical Arrows

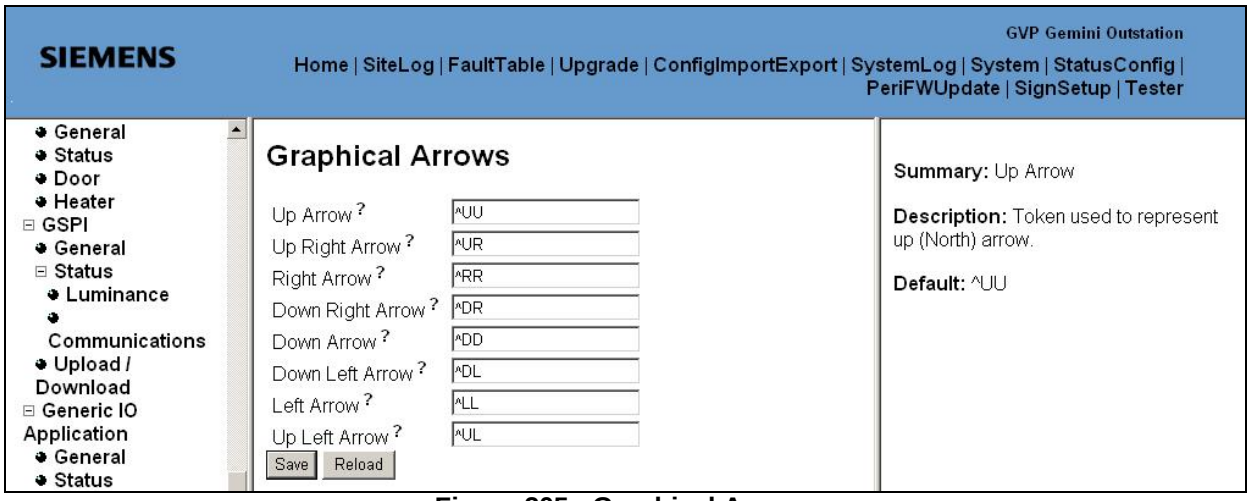


Figure 205 - Graphical Arrows

Eight directional graphical arrows are supported by the sign. The ASCII string used by the instation to activate each arrow is defined as follows:

Graphical Arrow
Description: Token used to represent directional arrow.
Default: depends on arrow direction

13.11.7 Special Words

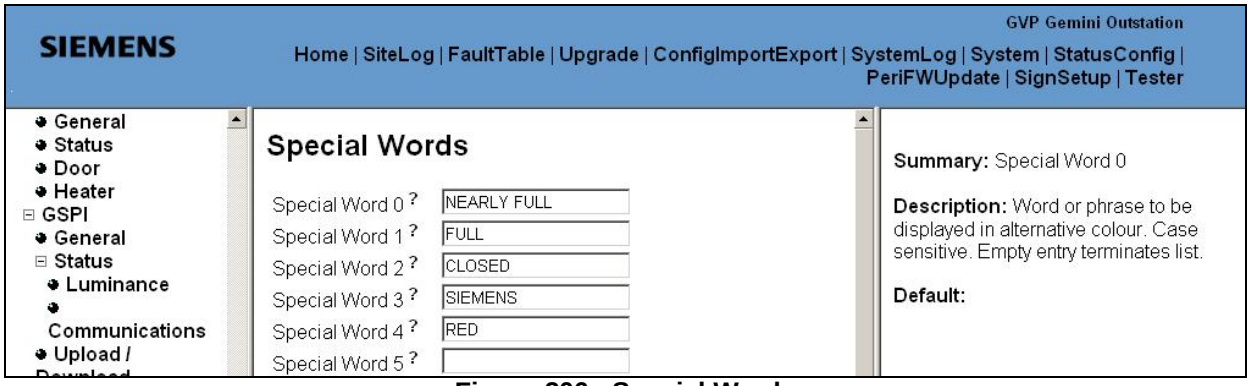


Figure 206 - Special Words

Each special word is defined as follows. All entries are case sensitive. An empty entry terminates the list:

Special Word n
Description: Word or phrase to be displayed in alternative colour.
Default:

13.11.8 Preset Messages

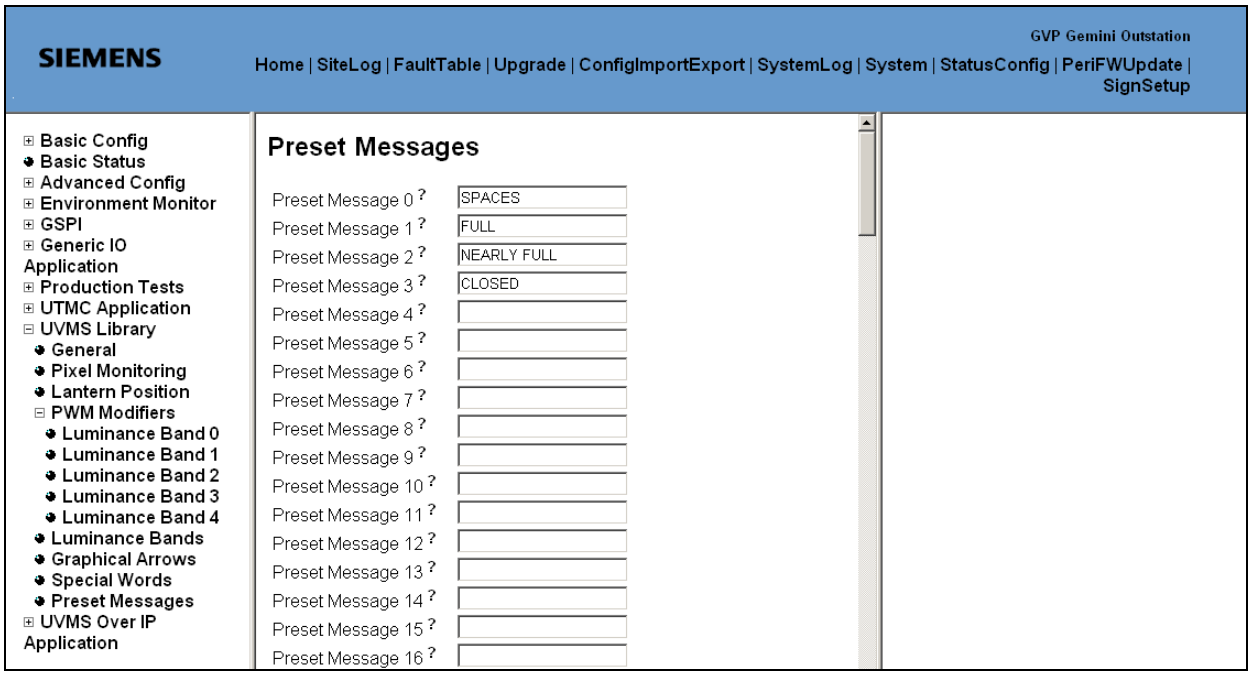


Figure 207 - Preset Messages

Preset Message 0
Description: Configure a preset message.

Note: When entering a message, '\n' should be used to separate text for separate rows e.g. SIEMENS\nTRAFFIC

13.12 STATUSCONFIG: UVMS OVER IP APPLICATION

13.12.1 General

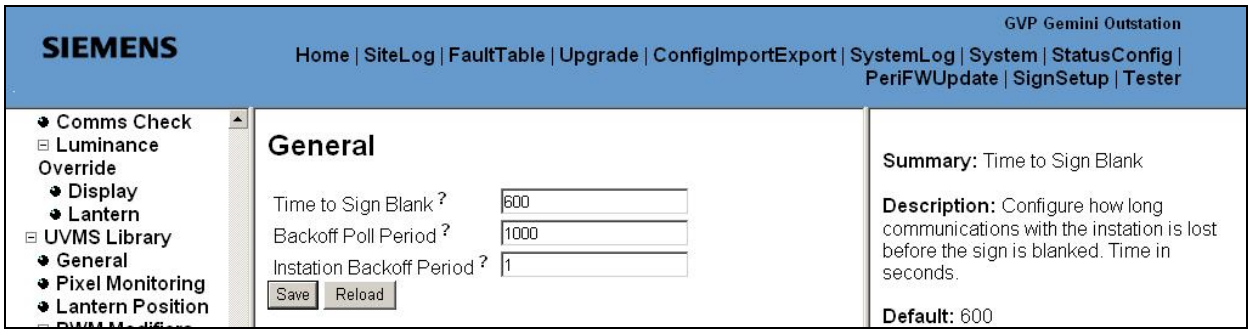


Figure 208 - General

Time to Sign Blank
Description: Configure how long communications with the instation is lost before the sign is blanked. Time in seconds.
Default: 600

Backoff Poll Period
Description: The application poll period during backoff (milliseconds).
Default: 1000

Instation Backoff Period
Description: Configure the instation communications backoff period in minutes.
Default: 1

13.12.2 Instation IP Communications

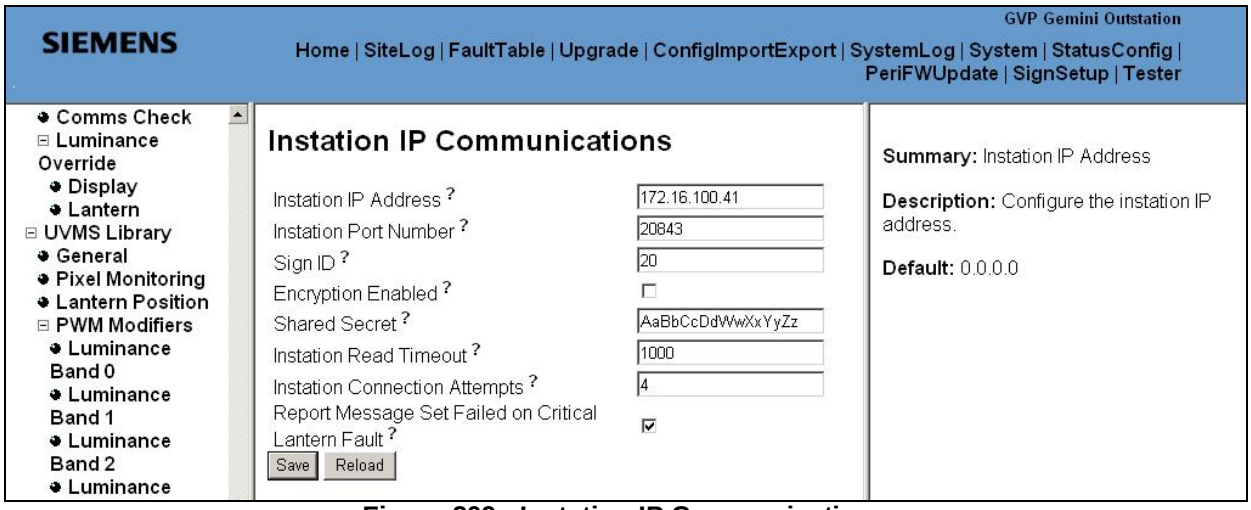


Figure 209 - Instation IP Communications

Instation IP Address
Description: Configure the instation IP address.
Default: 0.0.0.0

Instation Port Number
Description: Configure the instation port number.
Default: 0

Summary: Sign ID
Description: The ID of this sign on the UVMS network.
Default: 1

Encryption Enabled
Description: Protocol encryption is enabled.
Default: true

Shared Secret
Description: The secret shared with the instation used for encryption. Must be 16 characters in length.
Default: AaBbCcDdWwXxYyZz

Instation Read Timeout
Description: Configure the instation read timeout in milliseconds.
Default: 1000

Instation Connection Attempts
Description: Configure the number of instation connection attempts before backing off.
Default: 4

Report Message Set Failed on Critical Lantern Fault
Description: If true then will report that message set failed in addition to lantern failure when the sign is blanked due to a lantern fault. Useful for instation compatibility.
Default: true

13.12.3 Luminance Overrides

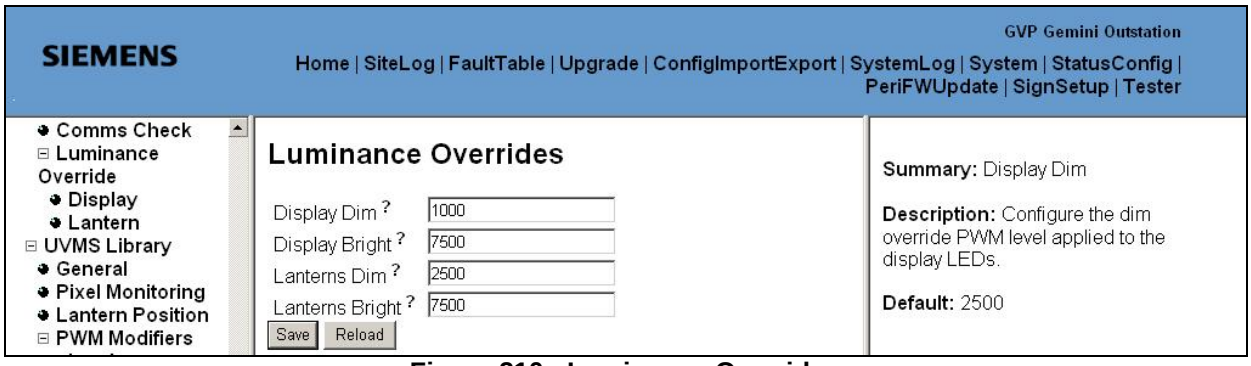


Figure 210 - Luminance Overrides

Display Dim
Description: Configure the dim override PWM level applied to the display LEDs.
Default: 2500

Display Bright
Description: Configure the bright override PWM level applied to the display LEDs.
Default: 7500

Lanterns Dim
Description: Configure the dim override PWM level applied to the lantern LEDs.
Default: 2500

Lanterns Bright
Description: Configure the bright override PWM level applied to the lantern LEDs.
Default: 7500

14 APPENDICES

14.1 APPENDIX A - INSTALLATION CHECKLIST

Installation – first fix

Description	Expected value	Measured value	OK?
Bolts tightened to correct torque? (8.1)	Pass		
Eye-bolt stowed in sign? (8.2.3)	Pass		

Installation supervisor name:
Installation supervisor signature:
Date:

Figure 211 - First Fix Checklist

Installation – second fix

Description	Expected value	Measured value	OK?
Insulation test (10.1)			
500V insulation test	> 10 MΩ		
Polarity test (10.2)			
Line – earth	200V to 253V rms		
Neutral - earth	< 10 V rms		
Line – Neutral	200V to 253V rms		
Earth loop impedance – Elektra enc (10.3.1.1)			
Master switch Line I/P to Master Switch cover	< 1.84Ω		
Master Switch Line I/P to Primary Earth Stud	< 1.84Ω		
Transformer or SMPS Line I/P to transformer / PSU frame	< 5.93Ω		
Gemini Line I/p to Comms Panel	< 13.14Ω		
Maintenance Socket MCB output to Maintenance Skt Earth pin	< 3.00Ω		

Installation – second fix (Continued)

Description	Expected value	Measured value	OK?
MDU maintenance skt RCD test (10.4)			
No trip test (15mA)	Pass		
Rated crnt (30mA)	< 200 ms		
Rated crntx5 (150mA)	< 40 ms		

Installation supervisor name:
Installation supervisor signature:
Date:

Figure 212 - Second Fix Checklist

14.2 APPENDIX A - COMMISSIONING CHECKLIST

Description	Expected value	Measured value	OK?
Functional test (See 11)			
Power up test	Pass		
Gemini hardware config.	Pass		
Diagnostic WEB interface comms	Pass		
Heater test	Pass		
Light sensor test	Pass		
Display test	Pass		
Fault table clear	Pass		

Installation supervisor name:
Installation supervisor signature:
Date:

Figure 213 - Commissioning Checklist

14.3 APPENDIX B – UPDATING FIRMWARE

It is possible to update all firmware within the sign (Gemini, sensor and row-driver) through the web pages. The Gemini firmware contains the peripheral (sensor & row-driver) firmware and so the process is performed in two steps:

1. Update Gemini firmware. This is described in section 14.3.1.
2. Update peripheral firmware if necessary (this may not change between Gemini firmware versions). This is described in section 14.3.2.

It is not necessary to perform step two immediately after step one – some time may be left between the steps if desired.

14.3.1 Updating Gemini Firmware

14.3.1.1 Upgrade Gemini Already Running Elektra Firmware

For upgrade using the web interface please refer to the section on 'Upgrade Screen' in GVP Reference Manual 667/HB/31760/000.

For upgrade using the handset interface please refer to the section on 'WIZ: Upgrade' in GVP Reference Manual 667/HB/31760/000.

14.3.1.2 Converting Non-Elektra Gemini for use in Elektra

It is likely that the ELEKTRA Gemini has been supplied with the correct firmware, but if it is necessary to convert a non-Elektra Gemini for use in Elektra then the Gemini Firmware Update Tool can be used.

IMPORTANT

Although it is possible to load firmware using the Web Interface, this should only be done if you are upgrading a Gemini which is to continue to be used for the same purpose. The Update Tool must be used if for example you are to change the firmware in a compatible UTMC OTU so it can be used in an ELEKTRA Sign.

The following items, both available from the Siemens Mobility Traffic Solutions support site (http://www.siemens.co.uk/traffic/en/index/downloads.htm), are required to perform this operation:

- The Gemini Firmware Update Tool - a Self Extracting ‘zip’ file called “**Update.exe**”, part number 667/TZ/33901/000.
- The .jffs2 Elektra file system image – part of 667/TZ/33979/000

The following is a Step by Step guide to convert a Gemini Unit using this tool:

STEP	ACTION
1	The procedure requires the following – 1) A computer running either Windows NT, Windows 2000,Windows XP or Windows 98. 2) A serial lead to connect from the computer to the Gemini Unit to be updated. A USB to RS232 converter may be required depending on the laptop.
2	Drag the attached “Update.exe” onto the desktop of the computer that is to perform the update.
3	‘Double Click’ the “Update.exe” icon on the desktop.
4	A Dialog Box is displayed with the prompt – ‘ To unzip all files in the Update.exe to the specified folder press the ‘Unzip Button’’. Before pressing the ‘Unzip Button’ first decide where the unzipped information will be placed. If the default (C:\) location is required just select ‘Unzip’ or Browse to a convenient directory and then press ‘Unzip’.
5	The Gemini Update information will now be placed in a directory

	C:\Update (if location of C:\ was selected)
6	Close the Dialog Box 'To unzip all files …..Button' and open Directory C:\ Upgrade.
7	Using 'Explorer' navigate to the directory C:\Upgrade (if default directory C:\ selected). In this directory will be 4 files – 1. Readme.txt – This gives a brief description of the Update Package. 2. cygwin1.dll – this is code required by the Update program 3. GeminiUpgrade.exe – this is the executable program that will download the update information to the Gemini Unit. 4. GEMINI FIRMWARE UPDATE TOOL OPERATING PROCEDURE.doc –
8	Connect the Gemini Unit's handset port to Port 1 of the computer.
9	'Double Click' the "GeminiUpgrade.exe" icon
10	Follow the instructions on the Dialog Box displayed on the screen.
11	When the Dialog Box 'OPEN' is displayed, select the firmware image to use (ending in .jffs2) and then select 'OPEN'.
12	The remainder of the Update continues with required action prompts until the final Dialog, which instructs the user to 'Replace Watchdog Link' (it is no longer necessary to remove the watchdog link so may not have been removed), 'press Reset and then press the Space Bar'. NOTE - The download process will take between 5 – 7 minutes.
13	Closedown any Dialog Box associated with the Update

Table 10- File System Upgrade Process

14.3.2 Programming Peripheral Boards (Sensor & Row Drivers)

Updated peripheral (sensor and row-driver) firmware may be contained in updated Gemini firmware. This can be determined by comparing the firmware version on the Peripheral Firmware Update page with that currently running in the peripherals (given for each peripheral on the Sign Setup page).

Section 13.2 contains details of how to update the peripheral firmware.

14.4 APPENDIX C – IMPORTING / EXPORTING CONFIGURATIONS

Refer to Section on 'Config Import / Export' in GVP Reference Manual 667/HB/31760/000.

14.5 APPENDIX D – PART NUMBERS AND SPARES LIST

Use of components other than those listed, or modifications or enhancements that have not been authorised by Siemens Mobility Traffic Solutions may invalidate the warranty and/or safety of this product.

Listed below are all the currently available main parts for Elektra Signs.

Description	TS Part Number
General Kit of Parts	**667/1/44605/000**
Master Switch Kit – Standard (1 X Former)	**667/1/44650/000**
Master Switch Kit – Full (Fully Populated)	**667/1/44650/001**
Master Switch Mounting Panel	**667/2/44651/000**
Master Switch Cover	**667/2/44652/000**
Master Switch Label	**667/2/44653/000**
DIN Rail 235mm Long	**667/2/44654/235**
DIN Rail End Stop	**703/4/01366/004**
Master Switch Sign Mounting Panel	**667/2/44655/000**
2 Gang Surface Box	**561/4/20921/000**
20mm Conduit (Socket)	**915/4/10337/000**
End Cover	**703/4/10328/000**
32A 1-Pole Switch	**408/4/97165/002**
63A 2-Pole Switch	**408/4/97165/011**
Lightning Protector	**516/4/00136/000**
RCD DBL Socket 30mA	**516/4/02062/000**
Fuseholder 5A	**516/4/97053/000**
Fuseholder 20A	**516/4/97053/002**
Fuseholder BS88	**516/4/97064/000**
Circuit Breaker 6A	**516/4/97076/006**
Fuse Slow Blow 10A	**518/4/90352/004**
4W Neutral Block	**703/4/10285/000**
10A Mains Filter on /000 only	**422/4/09906/010**
??A Mains Filter on /001 only	**422/4/09906/???**
Light Sensor Assembly	**667/1/44660/000**
Light Sensor Mounting Plate	**667/2/44661/000**
Light Sensor Mounting Plate Seal	**667/2/44662/000**
Light Sensor	**667/1/31259/001**
Light Sensor Box	**915/4/10319/000**
Light Sensor PCB	**667/1/31250/000**
Street Cable Termination Kit	**667/1/44690/000**
Street Cable Anchor Plate	**667/2/44645/000**
Comms Panel Kit	**667/1/44630/000**
Gemini ELEKTRA	**667/1/32605/102**
Comms Mounting Panel	**667/2/44631/000**
Comms Adjust BRKT	**667/2/44632/000**
Comms Slider	**667/2/44633/000**
Work Positioning Bar Fixing Kit	**667/1/44692/000**
Work Positioning Bar Fixing Spacer	**667/2/44643/000**
Work Positioning Bar Fixing Shim	**667/2/44644/000**
Row Driver Module Assembly	**667/1/33980/002**
Sensor Module PCB Assesmbly	**667/1/33980/001**
PSU Assembly 240 Char Only	**667/1/33966/001**
100mm Ch PCB Assembly Amber	**667/1/33951/001**
100mm Ch PCB Assembly Red/Green	**667/1/33951/002**

160mm Ch PCB Assembly Amber Full Matrix	**667/1/33953/001**
160mm Ch PCB Assembly Red/Green Full Matrix	**667/1/33953/002**
160mm Ch PCB Assembly Amber 5 x 7 Matrix	**667/1/33957/001**
240mm Ch Amber PCB Assembly	**667/1/33955/001**
Lantern Display Assembly (No PSU)	**667/1/44610/800**
Row Driver Module Assembly	**667/1/33980/002**
PSU Assembly	**667/1/33966/001**
5V Power Cable Assembly	**667/1/44636/001**
Lantern Window	**667/2/44613/800**
PCB Interconnect Cable	**667/7/44637/000**
PCB Power Cable Connector	**998/4/03913/002**
CAT5E RJ45 Cable 0.2m	**998/4/88351/002**
CAT5E RJ45 Cable 0.5m	**998/4/88351/005**
CAT5E RJ45 Cable 1m	**998/4/88351/010**
CAT5E RJ45 Cable 2m	**998/4/88351/020**
CAT5E RJ45 Cable 3m	**998/4/88351/030**
500VA Transformer Kit	**667/1/44670/000**
TX MTG Plate	**667/2/44671/000**
500VA Transformer	**667/7/44920/000**
Switched Mode Power Supply Assembly	**667/1/44675/000**
SMPS Mounting Plate	**667/2/44676/000**
PSU Fuse Label	**667/2/44675/000**
SMPS – 10A 250V	**605/4/08695/000**
10A Fuse	**518/4/97065/000**
Terminal Block 1 Way 13A Fused	**703/4/10327/000**
GPRS Option Kit	**667/1/44680/000**
GPRS Modem	**656/4/21386/000**
GPRS Antenna	**640/4/90014/000**
GPRS Modem RS232 Cable	**667/1/30618/001**
GPRS Modem Power Cable	**667/1/30616/001**
Antenna Cable	**667/7/30806/000**
Inspection lamp Kit	**667/1/44665/000**
Ladder Lanyard Kit	**667/1/44695/000**
Ladder Lanyard Tie-Off	**667/2/44642/000**
Ladder Lanyard Label	**667/2/44656/000**
Intercostal to Front Panel Support Kit	**667/1/44694/000**
Intercostal to Front Panel Support Bracket	**667/2/44641/000**
Work Positioning Bar Intercostal Mounting Kit	**667/1/44693/000**
Work Positioning Bar Support Bracket	**667/2/44646/000**
TI Enclosure Frame (Monopole)	**667/2/44001/000**
TI Enclosure Frame (Multi-pole)	**667/2/44011/000**
TI Enclosure Frame (Sign on Stanchion)	**667/2/44021/000**
Door Fixing Kit (Small)	**667/1/44620/100**
Door Fixing Kit (Medium)	**667/1/44620/300**
Door Fixing Kit (Large)	**667/1/44620/400**
3 Point Lock (Small)	**667/7/31720/003**
3 Point Lock (Medium)	**667/7/31720/003**
3 Point Lock (Large)	**667/7/31720/004**
Main Door Hinge	**667/7/28519/000**
Micro Switch Bracket	**667/2/44624/000**
2.8m Door M/Switch Cable	**667/1/44636/028**
Telescopic Slide 370mm	**999/4/44112/000**
Telescopic Slide Eyelet	**999/4/44112/001**
Ventilation Cover	**667/2/44623/000**
Ventilation Filter	**412/4/30007/000**
Rope	**998/4/88272/000**

Elektra Heater Kit Assembly	**667/1/44685/000**
Relay	**507/4/39652/000**
Din Rail End Stop	**703/4/01366/004**
Din Rail	**667/7/30336/000**
Heater Warning Label	**667/2/44658/000**
Gemini Battery Kit	**667/1/30615/000**
Gemini RTC Back-up Battery – 3V Coin Cell	**418/4/53433/000**
Outstation Back-up Battery – 12V Sealed Lead Acid	**418/4/42314/010**
Gemini Lead Acid Fuse (5mm x 20mm – 5A 250V QB)	**518/4/90285/008**
Processor (5mm x 20mm –250mA 250V QB)	**516/4/90285/001**
RTC Back-up Battery – 3V Coin Cell	**418/4/53433/000**
Outstation Back-up Battery – 12V Sealed Lead Acid	**418/4/42314/010**

14.6 APPENDIX E – GNU GENERAL PUBLIC LICENCE

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Version 2, June 1991

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END OF TERMS AND CONDITIONS

14.7 APPENDIX F –CERTIFICATE OF CONFORMITY

Certificate

EC-CERTIFICATE OF CONFORMITY

0086-CPD-554158

In compliance with the Directive 89/106/EEC of the Council of European Communities of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to the construction products (Construction Products Directive - CPD), amended by the Directive 93/68/EEC of the Council of European Communities of 22 July 1993, it has been stated that the construction product

Elektra range of Variable Message Signs installed permanently for the instruction and guidance of road users on public and private land, including tunnels

as detailed on the supplementary information sheet, placed on the market by and produced at

Siemens plc, Sopers Lane, Poole, Dorset, BH17 7ER

is submitted by the manufacturer to a factory production control and to further testing of samples taken at the factory in accordance with a prescribed test plan and that the notified body - BSI - has performed the initial type-testing for the relevant characteristics of the product, the initial inspection of the factory and of the factory production control and performs the continuous surveillance, assessment and approval of the factory production control.

This certificate attests that all provisions concerning the attestation of conformity and the performances described in the Annex ZA of the standard

EN 12966-1:2005 + A1:2009

were applied and that the product fulfils all the prescribed requirements.

For and on behalf of the British Standards Institution, a Notified Body for the above Directive (Notified Body Number 0086):

David Ford, Executive Director, Healthcare & Testing Services
BSI

Date 3 September 2010

This certificate first issued Date 3 September 2010

This certificate remains valid as long as the conditions laid down in the harmonised technical specification in reference or the manufacturing conditions in the factory or the factory product control itself are not modified significantly.

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Certificate

EC-CERTIFICATE OF CONFORMITY

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SUPPLEMENTARY INFORMATION

Siemens plc, Sopers Lane, Poole, Dorset, BH17 7ER

ELEKTRA VARIABLE MESSAGE SIGNS							
Reaction to horizontal load							
Model	Wind speed	Max width	Max height	Wind pressure	Snow pressure	Deflection - bending	Deflection - torsion
Cantilever TI Sign	Normal	3.40m	2.50m	WL6	DSL4	TDB4	TDT4
Cantilever CP Sign	Normal	3.40m	2.50m	WL6	DSL4	TDB4	TDT4
Cantilever TI Sign	High	3.40m	2.50m	WL9	DSL4	TDB4	TDT4
Cantilever CP Sign	High	3.40m	2.50m	WL9	DSL4	TDB4	TDT4
Stanchion TI Sign	Normal	3.02m	1.24m	WL6	DSL4	TDB4	TDT4
Stanchion CP Sign	Normal	3.02m	1.24m	WL6	DSL4	TDB4	TDT4
Multipole TI Sign	Normal	6.19m	3.5m	WL6	DSL4	TDB4	NA
Multipole CP Sign	Normal	6.19m	3.5m	WL6	DSL4	TDB4	NA
Multipole TI Sign	High	6.19m	3.5m	WL9	DSL4	TDB4	NA
Multipole CP Sign	High	6.19m	3.5m	WL9	DSL4	TDB4	NA
Impact Resistance	PASS						
Chromaticity co-ordinates and optical performance							
LED Colour:	Yellow	Red	Green				
Colour	C2	C2	C2				
Luminance	L3	L3	L3				
Luminance ratio	R3	R3	R2				
Beam width	B3	B3	B3				
Uniformity	PASS	PASS	PASS				
Visible Flicker	PASS	PASS	PASS				
Durability							
Temperature	T1						
Dust penetration	D2 (IP5X)						
Water penetration	P3 (IPX5)						
Corrosion	PASS						
Vibration	PASS						
Dangerous substances		No release					

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